

UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

APRIL, 1885.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

By **H. H. C. DUNWOODY,**
1st LIEUTENANT, 4TH ARTILLERY, U. S. A., A. S. O. AND ASSISTANT.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF WAR.

WASHINGTON CITY:
SIGNAL OFFICE.
1885.

LIBRARY OF CONGRESS,
RECEIVED
MAY 9 1901
DIVISION OF DOCUMENTS.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C. in time to be used in the preparation of the Weather Review for the month of April, 1885.

Name of vessel.	Observers.	Name of vessel.	Observers.	Name of vessel.	Observers.
Allan Line.		N. Y., Havana & Mexican Mail S. S. Co.		Miscellaneous.	
Br. s. s. Circassian.....	Capt. Wm. Richardson.	Am. s. s. City of Alexandria.....	Capt. J. W. Reynolds.	Br. s. s. Amethyst.....	Capt. Robt. Bennington
Greclan.....				Castelford.....	
Norwegian.....				Chiswick.....	
Scandinavian.....				Edith Godden.....	
Siberian.....	John G. Stephen.	North German Lloyd Steamship Co.		Matthew Bedlington.....	John H. Bennett.
	R. P. Moore.	Ger. s. s. America.....		Peconic.....	Thos. Kirby.
American Line.		Donau.....		Picqua.....	John Jenkin.
Br. s. s. British Princess.....	E. H. Fraeth.	Eider.....		Sikh.....	Wm. Clayton.
Am. s. s. Illinois.....		Elbe.....		Strathleven.....	A. Scotland.
Indiana.....		Emis.....			C. W. Pearson.
Br. Lord Clive.....		Fulda.....			
	Geo. H. Dodge.	Habsburg.....			
	R. W. Sargent.	Hermann.....			
	P. Urquhart.	Hohenzollern.....			
Anchor Line.		Mali.....			
Br. s. s. Australia.....	Alex. McRitchie.	Neckar.....			
Devonia.....		Nürnberg.....			
Elysia.....		Rhein.....			
Ethiopia.....		Salier.....			
Trinacria.....	Geo. Mitchell.	Strassburg.....			
		Werra.....			
		Weeser.....			
Anglo-Australian S. S. Co.		Ocean Steamship Company.			
Br. s. s. Fort Phillip.....	Geo. Dulling.	Am. s. s. City of Augusta.....	K. S. Nickerson.		
Atlas Line.		Occidental & Oriental S. S. Company.			
Br. s. s. Alisa.....	Jno. W. Sansom.	Br. s. s. Oceanic.....	John Metcalf.		
Alvo.....					
Andes.....		Oceanic Steamship Company.			
Athos.....		Am. s. s. Alameda.....	H. G. Morse.		
		Mariposa.....	H. M. Hayward.		
Bristol-City Line.		Oregon Railway and Navigation Co.			
Br. s. s. Brooklyn City.....	T. H. Gore.	Am. s. s. City of Chester.....	Thomas Wallace.		
Lundaw City.....		Columbia.....	Fred. Bolles.		
	T. L. Weiss.	Oregon.....	E. Polemann.		
California and Mexican S. S. Co.		Pacific Coast Steamship Company.			
Am. s. s. Newbern.....	E. T. Rogers.	Am. s. s. Orizaba.....	John N. Ingalls.		
		Santa Rosa.....	Chas. B. Johnson.		
		State of California.....	G. Debnay.		
Cunard Line.		Pacific Mail Steamship Company.			
Br. s. s. Aurania.....	W. H. P. Hains.	Am. s. s. Acapulco.....	W. G. Shackford.		
Bothnia.....		Br. s. s. Australia.....	R. C. Ghest.		
Catalonia.....		City of New York.....	Robt. R. Searle.		
Cephalonia.....		City of Para.....	L. Dexter.		
Gallia.....	Alex. McKay.	City of Peking.....	G. G. Berry.		
Seythia.....	Henry Walker.	City of Rio Janeiro.....	Wm. B. Cobb.		
	M. Murphy.	City of Sydney.....	H. C. Dearborn.		
	P. Whelan.	City of Tokio.....	Jefferson Maury.		
Edward Carr's S. S. Line.		Colima.....	W. B. Seabury.		
Ger. s. s. Australia.....	G. Frank.	Granada.....	M. Connolly.		
		San Blas.....	Thos. Chapman.		
Furness Line.		Quebec Steamship Company.			
Br. s. s. Durham City.....	M. P. Lund.	Br. s. s. Mariel.....	G. S. Locke.		
Stockholm City.....		Orinoco.....	Jas. S. Garvin.		
	R. Doyle.				
General Trans-Atlantic Steamship Co.		Red "D" Line.			
Fr. s. s. St. Laurent.....	M. de Jousselin.	Am. s. s. Caracas.....	W. M. Hopkins.		
Guinea Line.		Red Star Line.			
Br. s. s. Arizona.....	Sam. Brooks.	Belg. s. s. Beigneland.....	W. A. Beynon.		
Wyoming.....		Nederland.....	Allen J. Griffin.		
	C. L. Rigby.	Pennland.....	Rud. Weyer.		
Hamburg-American Line.		Rhyland.....	J. C. Jamison.		
Ger. s. s. Bohemia.....	R. Karibwa.	Switzerland.....	H. Buschmann.		
Prisia.....		Wesland.....	J. Ueberweg.		
Gellert.....		Westernland.....	W. G. Randle.		
Hammoula.....					
Lesing.....	B. Voss.	Rotterdam Line.			
Moravia.....	O. Penoldt.	Dutch s. s. Edam.....	J. H. Tant.		
Rhætia.....	H. Vogelgesang.	P. Caland.....	T. H. Bonjer.		
Rugia.....	A. Albers.	W. A. Scholten.....	G. J. Via.		
Wieland.....	C. Heibich.				
Westphalia.....	H. Barends.	Royal Mail Steam Packet Company.			
Inman Line.		Br. s. s. Gaudiana.....	C. W. Hanslip.		
Br. s. s. City of Berlin.....	Francis S. Land.	Royal West Indian Mail Steamship Co.			
City of Chicago.....		of Amsterdam.....			
City of Montreal.....		Dutch s. s. Orange Nassau.....	J. A. J. Lacrooy.		
City of Richmond.....					
	Arthur Redford.	State Line.			
	A. W. Lewis.	Br. s. s. State of Nebraska.....	A. G. Braes.		
Johnson Line.		State of Nevada.....	G. Moodie.		
Br. s. s. Nessmore.....	John Inch.				
Lamport & Holt's Steamship Company.		Thingvalle Line.			
Br. s. s. Biela.....	Fred. Graham.	Dan. s. s. Geiser.....	F. V. Schierbeck.		
Hevelius.....		Thingvalle.....	S. T. H. Laub.		
Belg. s. s. Hipparchus.....	John Carroll.				
	Wm. Kelly.	U. S. and Brazil Mail S. S. Co.			
Legland Line.		Am. s. s. Finance.....	Ch. Off. James Lord.		
Br. s. s. Venetian.....	W. H. Traut.	Warren Line.			
Virginian.....		Br. s. s. Iowa.....	Capt. Samuel Walters.		
	M. Pitt.				
Liverpool, Brazil and River Plate Steam Navigation Company.		White Cross Line.			
Br. s. s. Olbers.....	James Clarke.	Dutch s. s. De Ruyter.....	J. J. Brarens.		
Mallory Line.		White Star Line.			
Am. s. s. Colorado.....	Sam. Risk.	Br. s. s. Adriatic.....	H. Parrell.		
Lampasas.....		Baltic.....	R. E. Bence.		
San Marcos.....	M. B. Crowell.	Britannic.....	H. Perry.		
	A. C. Burrows.	Celtic.....	Benj. Gleadell.		
Mediterranean and New York S. S. Co.		Germanic.....	C. W. Kennedy.		
It. s. s. Archimede.....	Domenico Viola.	Republic.....	F. J. Irving.		
Gottardo.....					
Indipendente.....	P. Pirandello.	Wilson Line.			
		Br. s. s. Chicago.....	J. W. Jones.		
Min. & Dominion S. S. Co.		Galileo.....	Richard Potter.		
Br. s. s. Brooklyn.....	Geo. S. Dale.	Lepanto.....	Wm. Abbott.		
Ontario.....		Marengo.....	J. H. Malet.		
Oregon.....		Otranto.....	F. Kerr.		
Toronto.....		Rosario.....	Lieut. Rogers, R. N. B.		
	W. P. Couch.				
	H. C. Williams.	Winsor Line.			
	Jas. McAuley.	Am. s. s. Norman.....	Capt. H. W. Googins.		
Morgan's L. & Texas R. R. & S. S. Co.		Saxon.....	S. W. Snow.		
Am. s. s. Chamotte.....	Robt. B. Quick.				
National Line.					
Br. s. s. Canada.....	Wm. Pearce.				
Egypt.....					
Holland.....	J. Sumner.				
	Geo. Cochrane.				
New York and Cuba Mail S. S. Co.					
Am. s. s. Cienfuegos.....	C. M. Faircloth.				

MONTHLY WEATHER REVIEW.

VOL. XIII.

WASHINGTON CITY, APRIL, 1885.

No. 4.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during April, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart i.

The number of atmospheric depressions traced on chart i. and described under "Areas of low barometer" is eight, the average number for April during the last twelve years being 10.8.

The weather over the north Atlantic ocean during April, 1885, was generally moderate and without noteworthy features, except during the prevalence of the storms described as numbers 1 and 6, under "North Atlantic Storms."

The ice-region has extended unusually far to the eastward during this month, icebergs having been observed near W. 39°.

The mean temperature, as compared with the normal, exhibits no marked departure; on the Pacific coast and in the Rocky mountain districts it has been above the normal while to the eastward slight departures, both above and below the normal are shown.

The precipitation has been decidedly below the average in the south Atlantic and east Gulf states, Tennessee, the northern plateau and north Pacific coast region; it has been largely in excess of the average in the lower Missouri valley and west Gulf states.

Tornadoes and local storms were more numerous than in the preceding month, those occurring in the southwestern states from the 19th to 22d being the severest reported. Storms of this character for the year 1885, thus far, have been neither so destructive nor so frequent as in former years.

As a result of the heavy rainfall in the southwestern states destructive freshets occurred, causing much damage to crops and loss of stock.

The spring season has been from two to four weeks later than usual in the Mississippi valley and to the eastward; in the Rocky mountain districts and on the Pacific coast the season has been unusually advanced.

In the preparation of this REVIEW the following data, received up to May 20th, 1885, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and nineteen Canadian stations, as telegraphed to this office; one hundred and seventy monthly journals and one hundred and sixty-one monthly means from the former, and nineteen monthly means from the latter; three hundred and five monthly registers from voluntary

observers; forty-four monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly reports from the New England Meteorological Society, and from the local weather services of Alabama, Georgia, Indiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for April, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The mean atmospheric pressure is greatest on the north Pacific coast and in the south Atlantic states, where it ranges from 30.04 to 30.08; the barometric means are 29.95 or below over the central and southern Rocky mountain districts, British Northwest Territory, northern New England, and the Canadian Maritime Provinces; in the Rio Grande valley, southern Arizona, and over a portion of Utah the pressure is 29.9 or slightly below. Over the extensive area from the Atlantic coast between Massachusetts and North Carolina, northwestward to the north Pacific coast the mean pressures range from 29.98 to 30.08.

Compared with the mean pressures for March, there has been a slight increase (from .01 to .04) in the lower lake region, New England, and the Maritime Provinces, while in all other districts a decrease is shown. The difference is very slight along the Atlantic coast, while in all districts to the west of the Mississippi river, the mean pressure is more than .10 lower than for March, and in the Rocky mountain districts the decrease ranges from .20 to .30.

The departures from the normal pressure for April are given in the table of miscellaneous meteorological data and are also exhibited on chart iv. by lines connecting stations of equal departure. In the extreme northwest, the northern and middle plateau districts, and in California, the mean pressure is slightly below the normal, the departures ranging from .01 to .06; in all other districts the mean pressure is above the normal, the departures being less than .05, except in the lower lake region, the Atlantic coast districts, and the north Pacific coast region, where they vary from .05 to .10.

BAROMETRIC RANGES.

The monthly barometric ranges for the various Signal Service stations are given in the table of miscellaneous meteorological data; they were greatest in New England and least in the southern districts; over nearly the entire country the ranges were from .50 to .90; the greatest, 1.31 and 1.35, occurred at Boston, Massachusetts, and Block Island, Rhode Island, respectively; the least, 0.27 and 0.39, occurred at Key West, Florida, and San Diego, California, respectively.

AREAS OF HIGH BAROMETER.

Eight areas of high barometer have been traced over the territory occupied by the stations of observation, by the ap-

proximate location of the centre of greatest pressure at each consecutive morning telegraphic report, from the date of first appearance until the condition passed beyond the limits of the stations or disappeared within those limits. These high areas were generally first observed in the region north of the Missouri valley. Three advanced from the north Pacific coast; three disappeared in the southeast portion of the United States, and one developed in the lake region and passed directly eastward with increasing pressure.

I.—At the first telegraphic report of the month this area was central north of Lake Superior, accompanied by a well defined depression moving eastward over the Saint Lawrence valley. The barometer near the centre read above 30.4 and the temperature was near zero. During the succeeding day this area passed southeastward, the pressure remaining near 30.4, and it passed off the New England coast on the 2d, followed by a depression from the southwest. Snow fell in the northern portion of the lake region when the winds shifted to easterly in the southwest quadrant of this area on the night of the 1st, and this condition extended over the Saint Lawrence valley and northern New England on the 2d. It passed directly east from the coast and by the morning report of the 3d the winds had shifted to the south at the eastern stations.

II.—This area appeared north of Minnesota on the morning of the 2d; it was apparently a part of number i., and was separated from it by the advance of the storm traced as number i., on chart i. This area first moved to the southeast over the upper lakes, at the same time extending southward to Texas. On the 4th it passed over the Mississippi and Ohio valleys, the pressure falling below 30.2 while it increased in extent. The movement was slowly to the southeastward during the 4th, and it can be traced to the south Atlantic states where it disappeared as a high area on the 5th. Fair weather attended this area during the 4th and 5th, and frosts occurred as far south as the northern portions of Alabama and Georgia. The lateness of the season, however, prevented any serious injury to vegetation.

III.—This high area developed in the lower lake region on the morning of the 6th, and was apparently a part of the preceding area augmented by cold, dry air from north of the lake region. It passed directly eastward, attended by increasing pressure, and when it passed over the middle Atlantic states the barometer was .2 higher at the centre than it was in the lake region during the transit of this area. The barometer rose more than .5 on the middle Atlantic coast, and this area was preceded and followed by extended depressions, which became more clearly defined as the pressure increased at the centre of the high area. Upon reaching the Atlantic coast it extended from the Saint Lawrence valley to Florida, attended by cool, fair weather. This condition was followed during the night of the 7th by general rains which accompanied a trough of low barometer immediately to the west of this area.

IV.—This area was first observed on the north Pacific coast on the 6th. It passed east of the Rocky mountains, reaching the region north of Dakota on the 7th, and extending over the lower Missouri valley on the 8th, moving southeastward and causing the temperature to fall below freezing generally in the northwest. A light "norther" occurred on the Texas coast on the 8th, accompanied by only a slight fall in temperature along the Gulf coast. The direction of movement changed to easterly on the 8th, and by the morning of the 9th this area was central east of Lake Huron. While passing over the lake region the temperature fell to freezing, and frost occurred in Tennessee and North Carolina. This area reached the middle Atlantic coast on the 10th, when it disappeared without moving farther to the eastward, owing to the development of a storm off the south Atlantic coast and the rapid advance of a depression from the lake region.

V.—This area also appeared first on the north Pacific coast, where it remained from the 8th to the 10th before passing to the eastward. On the morning of the 11th it was central in northern Montana, and the easterly course continued with in-

creasing pressure until the 12th, when the centre had reached Manitoba. At this report it was observed that when the pressure at the centre of the high area had increased, about the same increase of pressure had also taken place in the low area to the eastward. This area extended southward over the eastern slope of the Rocky mountains during the 11th and 12th, the centre remaining far to the north until the 13th, when it passed to the lower Missouri valley, while, at the same time, the course of the low area to the eastward inclined more to the northeast. On the following day it extended over all districts east of the Mississippi and was inclosed by an isobar of 30.3, the barometer being highest in the Ohio valley and the temperature below 40° as far south as latitude 32°. Depressions were observed to the northeast and to the west of this area on the 14th, both of which were increasing in intensity, while the high area became less clearly defined and passed off the south Atlantic coast on the 15th.

VI.—The appearance of this area to the north of the lake region on the night of the 15th was the apparent cause of the retardation of the easterly movement of the low area which was central on the eastern slope of the Rocky mountains when the preceding high area disappeared. It advanced slowly towards the New England coast during the 16th, 17th, and 18th, and was central in New England at the morning report of the 19th. It then extended southward along the Atlantic coast and was central on the middle Atlantic coast on the 20th, near Cape Hatteras, North Carolina, on the 21st, and near Charleston, South Carolina, on the 22d, when an increase of pressure appeared in the extreme northeast, causing an extension of this area along the observed portion of the coast line. The barometer rose at the centre as this area advanced from the interior toward the coast, and the secondary area from the extreme northeast transferred the centre of the high area to the north Atlantic on the 23d.

VII.—This area appeared first in the north Pacific coast region, the barometer being above the normal in that district from the 18th to the 22d; an easterly movement was observed on the 23d, the area being then central north of Dakota. The pressure increased in the northwest and there was a slight southeasterly movement on the 23d which carried the centre to the Missouri valley, near Yankton, Dakota, on the 24th. It passed over the lake region and northern New England during the 24th, 25th and 26th, and disappeared to the east of Nova Scotia, the pressure at the centre remaining near 30.3 during the transit from the Pacific to the Atlantic coast.

VIII.—This area was observed in the region north of Montana on the 25th, when low areas were central in the eastern portion of the United States and on the Pacific coast. It passed eastward to the region north of Lake Superior during the 26th and 27th, when it was reinforced by an area from the west, the two forming an area which extended over the Missouri valley on the 28th and then passed over the central valleys, disappearing within the limits of the eastern portion of the United States on the 29th.

AREAS OF LOW BAROMETER.

Eight areas of low barometer have been traced within the limits of the United States during the month. On chart i. will be found the approximate paths of the centres of each depression traced, with the position of its centre at each of the tri-daily telegraphic reports. Several minor depressions of brief duration, or not wholly within the limits of the stations, have not been traced on the chart, although reference is made to them in the text. Five of the eight depressions traced moved eastward from Colorado; two developed in the Mississippi valley and one passed eastward over British America and was at no time central within the limits of the United States. No depression could be definitely traced from the Pacific coast, although low areas on that coast preceded the development of those traced from Colorado. It may also be remarked that two of these storms disappeared after reaching the Ohio valley by filling up, and that all others reaching the coast passed to the north of Cape Henry, Virginia.

The following table gives the latitude and longitude in which each depression was first and last observed, and the average hourly velocity of each depression within the limits of the stations:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.....	39 00	102 00	47 00	66 00	29.5
II.....	51 00	101 00	47 00	58 00	27.0
III.....	43 00	91 00	43 00	77 00	21.0
IV.....	40 00	103 00	39 30	85 00	10.0
V.....	37 00	107 00	50 00	92 00	27.0
VI.....	37 00	93 00	47 30	57 00	26.0
VII.....	40 00	104 00	47 00	59 00	30.0
VIII.....	40 00	104 00	39 00	85 00	25.0
Mean hourly velocity.....					24.8

I.—The month opened with an extended trough of relatively low pressure covering the eastern Rocky mountain districts while high areas were to the east and west of this trough, a condition favorable for the development of low areas. Number i. resulted from these conditions and was first located as a cyclonic disturbance on the afternoon of the 1st, central in eastern Colorado. It first moved to the southeast apparently urged to that course by the high areas to the northward but at the same time it extended to the northeast, forming a trough-shaped depression covering the upper Mississippi and Ohio valleys and lake region within which light rains and snow fell on the 2d, while the centre of disturbance reached the southern limit of its course in Arkansas on the afternoon of the 2d. This extended area moved eastward causing general rains in all districts east of the Mississippi, and snow in the lake region on the 3d. The energy increased and the pressure declined as the centre approached the Atlantic coast, and the depression became a well-defined circular cyclone while passing over the middle Atlantic states during the night of the 3d and morning of the 4th. It followed the coast line after reaching the vicinity of Cape May, attended by dangerous gales along the coast north of Cape Hatteras, and dangerous winds also on the west Florida coast when this storm was central in Virginia. The gales attending this storm reached their maximum force on the New England coast during the 4th. The advance of a second depression from the west extended the area of this storm, thereby diminishing the barometric gradient as it passed over the maritime stations to the northeast, and caused the storm to decrease in energy after passing north of New England. The second depression, which is not traced on the storm-track chart, passed north of the lake region during the 4th and 5th, and developed considerable energy on the last-named date, causing strong gales in the eastern portion of the lake region during the night of the 5th.

II.—This depression was at no time within the limits of the stations of observation, but reports from the northern stations indicated its easterly movement. It was first observed at the afternoon report of the 5th far to the north of Montana and probably had its origin on the north Pacific coast or further to the west. The centre moved in a southeasterly course and the disturbance showed great energy while passing over the Saskatchewan valley, and violent winds occurred in the northern Rocky mountain districts during the 6th when this depression was central north of Dakota. The barometer rose from 29.3 to 29.5 as the centre approached the lake region, but the dangerous winds extended over the lakes although with less force than the winds attending the depression in the far west. During the night of the 7th the winds shifted to westerly in the lake region, with increasing force, and in the upper lake region freezing weather occurred. By the morning of the 9th this storm had reached the Maritime Provinces and the cold wave following it caused freezing weather in New England and the middle Atlantic states; strong gales occurred at the extreme northeast stations when this depression passed to the east-

ward over the Atlantic, but the gradual filling up of the depression as it advanced from the centre of the continent and its extension upon reaching the Atlantic indicated that it was losing energy as it advanced.

III.—A slight depression was observed to the north of Dakota on the 9th, moving southeasterly toward the upper lakes. When this disturbance was central near Lake Superior a secondary depression was formed in the trough of low barometer which extended southward to the lower Missouri valley. When the winds shifted to westerly in this trough of low barometer a well-defined secondary cyclone was formed, central near LaCrosse, Wisconsin, at the 3 p. m. report of the 10th. This disturbance became the principal at the succeeding reports and it passed directly eastward, developing energy and becoming more clearly defined as a circular storm as it moved over the lower lake region, causing dangerous winds accompanied by snow and sleet. After passing to the east of Lake Ontario the pressure at the centre increased and the centre of the disturbance, although apparently moving eastward, could not be definitely located after the morning of the 12th, when the storm had exhausted its maximum energy.

IV.—This depression developed in Colorado during the night of the 13th, but the preceding reports showed an extended barometric depression covering the plateau and the Pacific coast regions, while a high area covered the eastern slope of the Rocky mountains. No cyclonic movement of the wind was observed until after the midnight report of the 13th, and from that time the depression advanced to the eastward until it reached the lower Missouri valley where it was retarded and forced to the westward by the high area then passing to the southeastward over the lake region. It gained sufficient energy to advance during the 16th, but only reached the central Ohio valley, where it filled up, the barometer remaining low in the southwest.

V.—The barometer continued low in the plateau and Rocky mountain regions after the advance of the preceding depression to the east. This condition of pressure continued until the 20th before the development of a depression of sufficient energy to assume a motion of translation. The afternoon report of the 20th showed high areas over the Atlantic coast and in the northwestern portion of the United States, with a tendency of the last named to press southward to the west of the low area, which had remained in the central Rocky mountain region several days. The course of this depression to the northeast by the extension of the isobars towards Manitoba and its rapid movement in that direction during the succeeding day was due to the cold air from the mountain regions flowing with high velocity to the south over Colorado. Heavy snows prevailed in Colorado on the 21st with temperature below freezing, while the temperature ranged from 50° to 60° in the Missouri valley as far north as Bismarek, Dakota. This disturbance assumed an elliptical form during the 21st, central near the northern Nebraska line and accompanied by freezing weather and heavy snow in Dakota, Wyoming, and Colorado on the afternoon of the 21st and by warm rains in the Missouri valley. These conditions continued at the midnight report, the storm moving almost directly north and the isotherms of 60°, 50°, 40° and 30° being almost north and south between Iowa and Wyoming. The pressure decreased at the centre as this storm moved to the northward until the centre passed beyond the limits of the stations, when its course changed to the northeast, after which the area increased and the barometer rose at the centre, indicating that this storm developed its maximum intensity while within the limits of the United States, and that it was filling up after passing north of the forty-eighth parallel.

VI.—This area developed in the Arkansas valley on the 25th, when a high area was passing over the lake region and a second depression also existed in the northwest. These depressions moved towards the lower lake region where they united on the morning of the 26th, with considerable increase of energy in the resulting storms; but the afternoon report of the 26th showed two depressions connected by a trough of

low barometer—one near Cape May, New Jersey, and the other near Kingston, Ontario. These depressions united near Yarmouth, Nova Scotia, on the morning of the 27th, and the single disturbance disappeared to the northeast over Newfoundland on the 28th.

VII.—This low area also developed in Colorado to the southwest of a high area and after the period of low pressure in California and the south and central plateau regions, from the 25th to the 27th, when a depression of slight energy formed in eastern Colorado and moved rapidly eastward to the lower lake region during the succeeding twenty-four hours. The storm extended southward as it passed over the middle Atlantic states to southern New England during the 28th, causing severe gales at stations on the coast north of Wilmington, North Carolina. While passing along the New England coast the barometer fell to 29.2 at Boston, and the strongest gales of the month occurred. The barometer reached its minimum when this storm was central near Boston, and the pressure increased slightly during the passage of the storm to Nova Scotia, but when last observed in the extreme northeast the barometer was again falling at the centre.

VIII.—This area followed the general course of number vii, originating in eastern Colorado and advancing to the lower Ohio valley, where it was central at the close of the month. General rains attended the advance of this depression eastward, and numerous local storms occurred in the southwest and in the lower Mississippi valley. A further description of this storm will be given in the May REVIEW.

NORTH ATLANTIC STORMS DURING APRIL, 1885.*

[Pressure expressed in inches and in millimetres; wind-force by scale of 0-10.]

The paths of the atmospheric disturbances that have appeared over the north Atlantic ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports furnished through the co-operation of the "New York Herald Weather Service," and from other miscellaneous data received at this office up to May 21st, 1885.

Of the eight depressions charted, two, viz: numbers 2 and 8, were probably continuations of the storms traced over the United States and Canada as low areas i. and vi., but the reports covering the region north of 45° N. and between 45° W. and the coast of Newfoundland are not sufficiently numerous to admit of the tracing of a continuous track. Numbers 3 and 4 apparently developed near N. 40° and between W. 60° and 70°, while the remaining disturbances were first observed to the eastward of the fiftieth meridian. The general direction of movement of the storm-centres in April, 1885, was about east-northeasterly; the depressions which traversed the ocean during the first half of the month apparently changed their direction on approaching the European coasts; and moved to the southeastward over the Bay of Biscay. The only severe storms of the month were those traced as numbers 1 and 6; in these the barometer fell below 28.9 (734.0) and both were accompanied by heavy gales and very high sea. Dense fogs were of frequent occurrence during the month.

The following are brief descriptions of the storms charted:

1.—This depression appeared between N. 55° and 50°, and W. 20° and 30° on the 3d, having apparently moved from the regions north of the sixtieth parallel. By the 3d the pressure over the ocean within the above-mentioned limits had decreased from 30.3 (769.6) to 29.5 (749.3) and the wind had freshened to the force of a moderate gale; on the 4th the decrease of pressure extended to the British Isles and the disturbance was moving slowly east-southeastward towards the coast. During the night of the 4-5th the wind increased to a strong gale and the barometer fell rapidly; at midnight of the 4th the s. s. "City of Richmond," A. W. Lewis, commanding, in N. 48° 20', W. 28° 30', had barometer 29.48 (748.8), wnw. gale of force 9; on the 5th the centre of disturbance was between W. 15° and 20° and

the barometer ranged from 28.7 (729.0) to 28.95 (735.3.) Strong w. and nw. gales prevailed over the ocean between N. 45° and 50° and from W. 30° eastward to W. 15°, with strong se. winds to gales over the British Isles, and along the French coast. This weather continued during the 6th, when the centre of disturbance lay to the southwest of Ireland; during the day it passed southeastward over the Bay of Biscay; the wind shifted to e. over the British Isles and blew strongly, while the heavy n. and nw. gales continued without abatement over the ocean west of the fifteenth meridian.

The following are the lowest pressures reported: s. s. "State of Nevada," J. A. Stewart, commanding, in N. 54° 43', W. 15° 43', on the 5th, barometer 28.76 (730.5), wind s., force 5; s. s. "Adriatic," H. Parsell, commanding, in N. 51° 2', W. 15° 50', barometer 28.96 (735.6), wind wsw., force 9, very heavy sea, rain squalls; s. s. "Hanoverian," B. Thompson, commanding, in N. 52° 32', W. 23° 56' at noon, had lowest barometer, 29.05 (737.9), at 4 a. m. of the 5th, wind blowing a hurricane from nw. with terrific sea; ship hove-to, and received considerable damage about the decks, the heavy seas smashing boats, sky lights, doors, etc.; s. s. "Anchoria," Captain Small, commanding, reported a gale from s. at 1 a. m. of the 5th, gradually backing and ending at ne. at 8 a. m. of the 6th; the lowest barometer was 29.14 (740.1) at 6 p. m. of the 5th, in N. 55° W. 18°. The s. s. "Wandrahm" N. J. Hundewadt, commanding, had a whole gale from w. by s. to nw.; the gale began at 11 p. m. of the 4th, and at 5 a. m. of the 5th, in N. 48° 30', W. 17° 0', the barometer read 29.1 (739.1), wind shifting to w. and nw.; the gale lasted until 4 a. m. of the 7th. The s. s. "Nürnberg," A. Jaeger, commanding, reported as follows: "from April 5th to 6th, in N. 49° W. 18° 5', we had a very heavy storm from wnw. and nw., accompanied by rain and hail squalls of hurricane force and a very high and dangerous cross sea from sw., w. and nw. The lowest barometer reading was 29.19 (741.4), at 5 a. m. on the 6th, wind nw., force 10; ship's course, wsw., $\frac{1}{2}$ w., making two knots an hour at full speed ahead; the wind blew hardest at 10 a. m., from which hour it began to decrease and the barometer rose slowly. At 9.30 p. m. of the 5th the mast-heads and yard-arms were tipped with Saint Elmo's fire, and vivid lightning came out of the heavy black clouds; a ball of fire exploded with a loud noise resembling the report of a gun; after this phenomenon the gale increased to hurricane force."

The following reports refer to the 6th: s. s. "Iowa," S. Waters commanding, in N. 51° 02', W. 12° 24', reported barometer 28.94 (735.1), wind sse., force 5, raining; s. s. "Australia," A. McRiche, commanding, in N. 48° 38', W. 10° 34', barometer 28.86 (733.0), wind sw., force 8, misty and rainy, very high w. sea; s. s. "Noordland," H. Nickels, commanding, at 6 p. m. of the 6th, in N. 49° 00', W. 16° 00', had a whole gale from w. by n. to ne., lowest barometer 29.28 (743.7); s. s. "Matthew Bedlington," T. Kirby, commanding, in N. 47° 40', W. 20° 00', at 3 p. m., barometer 29.36 (745.7), wind sw. shifting to w. and nw., and then to n. and ne., force 9, with unusually high sea; s. s. "Nederland," Captain Griffin, commanding, at noon of the 6th, in N. 48° 06', W. 21° 10', had barometer 29.65 (753.1), severe storm from nw. and w. with very heavy sea, doing considerable damage about the decks and carrying away the bridge, etc.; s. s. "British Prince," S. Nowell, commanding, in N. 48° 57', W. 29° 08', barometer 29.63 (752.6), wind n., fierce snow squalls and mountainous sea, gale at times shifting to nw. and w.

The following reports are taken from various newspapers: 3d, ship "Cyrus Wakefield," in N. 49° 19', W. 21° 26', was hove to under bare poles for four days; 4th, ship "Falstaff," in N. 47° 13', W. 18° 50', very heavy wnw. gale, stove boats, etc.; s. s. "Germanic," five hundred miles west of Fastnet, encountered terrific storms during the night of the 4-5th; vessel sustained serious damage and returned to Queenstown; 5th, s. s. "Boston City," in N. 50° 17', W. 17° 13', hurricane from ssw. to nnw., lasting twenty-four hours, ship hove to; ship "Cressington," in N. 46° 21', W. 19° 16', heavy gale with very heavy sea, damaging decks, etc.; ship "Lucille," in N.

47° 46', W. 15° 0', heavy gale from sw. to nw. lasting during the 6th; barometer, 29.1 (739.1).

2.—This was probably a continuation of the storm described as low area i. under "Areas of low barometer." It occupied the Canadian Maritime Provinces during the 5th and 6th and caused strong w. winds off the coast as far south as the thirty-fifth parallel; on the 7th the storm-centre was south of Newfoundland with the barometer about 29.6 (751.8); between W. 60° and 65° the nw. winds increased to the force of a gale, while fresh w. breezes prevailed between W. 60° and 55° and strong s. winds to the eastward of the last-mentioned meridian. On the 8th and 9th the depression lay between the meridians of 40° and 50° West and the parallels of 43° and 48° North, the pressure varying from 29.5 (749.3) to 29.7 (754.4) with strong breezes or moderate gales. By the 10th the region of low barometer was transferred to about N. 50°, W. 38°, the pressure and winds remaining unchanged. On the 11th the lowest reported barometric reading was 29.64 (752.8), in about N. 50°, W. 22°, winds moderate in force and variable in direction. During the day the disturbance apparently moved south-eastward to the Bay of Biscay, the winds to the northward of the fiftieth parallel shifting to easterly.

3.—This depression appeared near N. 40°, W. 65°, on the 11th; on the morning of that date the barometer read 29.33 (745.0), and moderate e. and ne. gales prevailed over the region between N. 40° and the coast of Nova Scotia, with n. winds to the westward of 67° W. At 8 p. m. of the 11th the s. s. "Marengo," J. H. Malet, commanding, in N. 42° 00', W. 58° 30', had barometer (aneroid) 28.85 (732.8), wind se., veering to s., sw., and wnw., and blowing a whole gale; at the same hour the s. s. "Servia," Captain McMickan, commanding, in N. 41° 23', W. 59° 40', had barometer 29.14 (740.1), wind e., veering to se., s., and sw., force 10; at 8.30 p. m. the s. s. "Prydain," M. Parry, commanding, reported barometer 29.35 (745.5), wind ene. to se., s., and w., force 10. During the 12th and 13th, the depression moved northeastward over the Banks, the winds shifting to w. and nw., and moderating after its passage, while the winds to the eastward of the Banks changed to s., but remained moderate in force. During the 14th and 15th it moved in an easterly course towards the European coasts without manifesting any decided storm-energy, the barometric gradients being slight, and on the 16th, it occupied the Bay of Biscay.

4.—This depression appeared between N. 40° and Bermuda on the 13th; on that date moderate n. and nnw. gales prevailed over the ocean between W. 65° and the coast of the United States, the barometer ranging from 29.75 (755.6) to 29.9 (759.4); near N. 40° and between W. 65° and 60° the pressure ranged from 29.6 (751.8) to 29.7 (754.4) with easterly winds of force 3 to 4.

As the depression moved northeastward across the fortieth parallel the barometer fell gradually; the s. s. "Colombo," H. R. Payn, commanding, reported at midnight of the 13th, barometer 29.3 (744.2), wind shifting from ene. to e., se., sw., w., and nw., and decreasing from force 10 to force 8 when the wind was nw., with vivid lightning throughout. The s. s. "Geiser," F. V. Schierbeck, commanding, was to the north-westward of the centre and reported: "14th, 3.50 a. m., barometer began to fall rapidly, wind freshening and shifting from w. to nnw.; 7.30 a. m., wind n. by e., force 6, sky overcast; 9.16 a. m. (N. 40° 58', W. 58° 14') barometer 29.57 (751.0), wind ne. by n., force 7; 1.50 p. m., in N. 40° 57', W. 49° 45', barometer 29.47 (748.5), wind ne., blowing in heavy gusts; each gust came after a small whirlwind which caused the sea to foam and whirl up; between the gusts, light winds and heavy rain, with lightning." The s. s. "City of Berlin," F. S. Land, commanding, had a s. gale at 2.30 p. m. of the 14th, which lasted until 10 p. m., veering to sw. and w., and ending at nw; the lowest barometer was 29.21 (741.9) at 3 p. m., in N. 41°, W. 58°; the s. s. "Iowa," S. Waters, commanding, had light e. winds and cloudy weather during the morning, barometer at noon, in N. 42° 7', W. 58° 40', 29.54 (750.3),

weather clearing, with rising barometer and nw. winds during the afternoon. The s. s. "Republic," P. J. Irving, commanding, in N. 41° 43', W. 52° 57', at 4 p. m. of the 14th, had barometer 29.05 (737.9), wind se., fresh gale, shifting to s., sw., and w. The s. s. "Ems," Chr. Leist, commanding, in N. 41° 17', W. 47° 44', had barometer 29.33 (745.0) at 10 p. m. on the 14th, fresh gale from sw. shifting to w and nw.

On the 15th the region of least pressure was near N. 45°, W. 45°; the s. s. "Celtic," B. Gleadell, commanding, reported barometer 29.14 (740.1) at 5 a. m. of the 15th, with strong gale from se. to s. and wsw. During the 15th moderate to strong s. and sw. gales were reported by vessels between N. 40° and 50° and W. 35° and 45°, the barometer over that part of the ocean ranging from 29.3 (744.2) to 29.6 (751.8). By the 16th the depression was to the northward of the fiftieth parallel and near W. 30°; during the day it disappeared from the chart.

5.—The reports for the 17th showed a decrease of pressure over the region between N. 40° and 50° and W. 40° and 50°; the s. s. "Canada," W. Pearce, commanding, in N. 43° 26', W. 42° 23', reported barometer 29.44 (747.8), being a fall of about .3 inch since the observation of the preceding day, wind sw., force 7, heavy rain. The s. s. "Wisconsin," E. Bentley, commanding, in N. 44° 10', W. 41° 10', at 8 a. m. of the 17th had barometer 29.1 (739.1), wind s. to sw. and w., force 10, with thunder and lightning. During the 18th, 19th, and 20th, the depression moved northeastward with steadily increasing pressure and moderate to strong winds or occasional gales; it apparently moved northeastward along the northwestern edge of an area of high pressure which stretched from the Bay of Biscay southwestward over the ocean during those dates. On the 21st the depression was near N. 55°, W. 20°, whence it passed northeastward beyond the range of observations.

6.—This was a severe storm which appeared near N. 50°, W. 38° on the 22d; on that date the s. s. "Circassian," Captain Campbell, commanding, had a gale from sw. which lasted from noon of the 22d until noon of the following day, ending from nw. to which direction the wind had veered; the lowest barometer reading was 29.23 (742.4) at midnight of the 22d, in N. 49° 0', W. 34° 45'. The s. s. "Aurania," W. H. P. Hains, commanding, at 8.24 p. m. of the 22d, in N. 46° 50', W. 37° 56', had barometer 29.46 (748.3), strong gale from sw. to nw. By the 23d the storm-centre had reached N. 49°, W. 25°, and during that and the succeeding day, it manifested much violence. The following are some of the reports relating thereto: s. s. "Venetian," W. H. Trant, commanding, reported at 6 p. m. of the 22d, weather unsettled, overcast, wind unsteady from ssw; at 6 a. m. of the 23d, unsteady winds from wsw, moderate in force, small rain, barometer 28.99 (736.3); hard gale from w. by n. sea rising rapidly, barometer 28.95 (735.3) (lowest reading); noon (N. 49° 8', W. 32° 15'), barometer 29.22 (741.7), hard gale from nnw., rain squalls; 6 p. m. strong wind, barometer 29.44 (747.8). The s. s. "Warwick," N. Lobbett, commanding, reported barometer 28.75 (730.2) at 9 a. m. of the 23d, in N. 48° 38', W. 31° 0', wind sw. to nw. and n., whole gale; s. s. "Greece," T. Foote, commanding, barometer 29.14 (740.1) at 8 p. m. in N. 47° 44', W. 27° 33', wind ssw. to w. and nw., whole gale; s. s. "Australia," G. Franck, commanding, at 8 p. m. in N. 48° 14', W. 25° 50', barometer (a) 28.65 (727.4), gale from sw. to nw. and n. force 10. The gale set in from sw. with hurricane force, and, veering to the w., decreased to light breeze for two hours, when it suddenly broke out from nw. with the same force as before, the barometer read low for three days; s. s. "State of Nevada," G. Moodie, commanding, at 6 a. m. of the 23d, in N. 52° 5', W. 29° 54', barometer 29.0 (736.6), wind sw. to s., se., e., and n., blowing with the force of a whole gale.

On the 24th the region of least pressure was in N. 50°, W. 18°, and from that position northward and eastward to the coast of the British Isles the pressure was not above 29.05 (737.9). The following reports indicate the presence of the storm-centre on the 24th: s. s. "City of Rome," R. D. Munro,

commanding, had barometer 28.69 (728.7) at noon of the 24th in N. 51° 27' W. 19° 10'; the storm began as a strong gale from s. and shifted to e. and ne. ending at n. and nw.; the s. s. "Republic," P. J. Irving, commanding, from midnight of the 24th to 4 a. m. of the 25th, when about eighty-four miles west of Fastnet, had barometer 28.8 (731.5), fresh gale from wnw.; s. s. "Rhaetia," Captain Vogelgesang, commander, had barometer 28.67 (728.2) at 1 p. m., in N. 50° 20', W. 17° 40', wind shifting from ssw., force 5-6, to se., force 7, thence to ne. and n., force 8 to 10; the s. s. "Richmond," G. Bain, commanding, in N. 49° 47', W. 9° 56' at 6 p. m. of the 24th had barometer 28.9 (734.0), wind s., suddenly veering to sw., with hail, thunder, and vivid lightning. During the 24th the depression appears to have moved northward along the Irish coast and by the 25th, it was off the northern coast of Ireland, with pressure below 28.6 (726.4).

7.—This disturbance appeared on the 27th, to the northward of the fiftieth parallel and between W. 25° and 30°; on the 27th the s. s. "Ethiopia," J. Wilson, commanding, reported barometer 28.68 (728.5), in N. 52° 22', W. 25° 29', being a fall of about .6 inch in twenty-four hours; wind, sw., force 3, overcast and raining. The s. s. "Etruria," Captain Cooke, commanding, had a gale from sw. shortly before noon of the 27th, veering to wsw. at 1 p. m., and to nw. by 1 a. m. of the 28th, from which direction it continued until 8 p. m. of the 28th; the lowest barometer was 28.9 (734.0) at midnight of the 27th in N. 51° W. 21°. The sea was very high and the wind occasionally attained hurricane force. Captain Park, commanding the s. s. "Scandinavian," in about N. 50° 49' W. 24° 20', reported as follows: "wind gradually backing to se. by s., moderate to strong breeze with rain; 6.30 a. m., wind hauling to w.; 1 p. m., strong breeze to fresh gale with violent rain squalls; 8 p. m., strong gale from wnw., wind veering to n., high, dangerous cross sea, engines going at reduced speed, lowest barometer reading 28.93 (734.8); 10.30 p. m., blowing a heavy gale from nw. to nnw., with heavy, confused sea, barometer rising slowly." During this date strong gales from sw. to nw. were experienced by vessels between N. 45° and 50° and W. 20° and 40°, with barometer ranging from 29.2 (741.7), to 30.0 (762.0). On the 28th this depression was off the northern coast of Ireland, the lowest reported barometer being 29.16 (740.7).

8.—This was probably a continuation of the depression which passed over Newfoundland on the 27th and described as number vi. under "Areas of low barometer;" its track during the 28th was beyond the range of the marine observations as yet to hand, but on the 29th a depression was shown near N. 50° and between W. 30° and 40°, where the lowest reported pressure was 29.6 (751.8), with moderate sw. and w. winds. On the 30th the depression approached the Irish coast, the barometer, in about N. 51°, W. 15°, reading 29.26 (743.2).

OCEAN ICE.

On chart i. are also exhibited the eastern and southern limits of the region within which icebergs have been observed during April, 1885. These limits are determined from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers.

During this month the easternmost icebergs were observed in N. 44° 10', W. 39° 41', by the s. s. "Illinois," G. H. Dodge, commanding; from that position westward between N. 44° and 46°, to about W. 45°, several isolated bergs were observed. From N. 46°, W. 45°, southwestward to N. 42°, W. 50°, the icebergs were more numerous and were observed in groups of four and five, together with much loose ice; many of the bergs were very large. The southernmost icebergs were reported in N. 41° 40', W. 49°, and 50°. There was much ice in the Gulf of Saint Lawrence and along the Newfoundland coast, navigation in the Gulf being interrupted at the close of the month.

A comparison with the chart for the preceding month (March, 1885,) shows that an unusual and very extensive movement of ice to the eastward, has occurred; the eastern limit for April

being no less than 4° 30' farther east than that of the preceding month. The southern limit is, however, about one degree north of the southern limit in March.

The following table shows the comparison between April, 1885, and the same month of the three preceding years:

Southern limit.			Eastern limit.		
Date.	Lat. N.	Lon. W.	Date.	Lat. N.	Lon. W.
April, 1882.....	40 51	52 25	April, 1882.....	46 5	41 36
April, 1883.....	40 49	52 6	April, 1883.....	48 0	43 0
April, 1884.....	41 26	48 46	April, 1884.....	45 25	43 34
April, 1885.....	41 40	49 50	April, 1885.....	44 10	39 41

Icebergs were reported as follows:

April 1st.—S. S. "Azalea," in N. 43° 00', W. 49° 00', passed an iceberg; passed another in N. 42° 42', W. 49° 52'.

2d.—S. S. "Republic," in N. 42° 32', W. 50° 16', passed an iceberg; bark "Beta," in N. 46° 00', W. 46° 00', passed field-ice and steered south for six hours to clear it.

3d.—S. S. "Virginian," near N. 42° 32', W. 48° 47' passed several small pieces of ice; s. s. "Wyoming," in N. 42° 53', W. 50° 26', at 4.05 p. m., passed a large iceberg; in N. 42° 41', W. 50° 13', at 4.50 p. m., passed a long, low iceberg; in N. 42° 55', W. 50° 11', at 5 p. m., passed a large iceberg; in N. 43° 24', W. 48° 33', at 10.55 p. m., passed a very large iceberg.

5th.—Bark "Maranee," in N. 46° 30', W. 45° 54', was crushed in an ice-floe and sunk; s. s. "Venetian," in N. 43° 20', W. 49° 00', passed a small iceberg about fifteen feet above water.

6th.—S. S. "Missouri," in 42° 00', W. 49° 59', passed a medium-sized iceberg.

7th.—S. S. "Zaandam," between N. 44° 20', W. 46° 50' and N. 42° 30', W. 50° 40', passed two large icebergs and several small pieces.

9th.—S. S. "Marengo," in N. 41° 45', W. 49° 2', at 2.35 p. m., passed an iceberg about one hundred feet long and thirty feet high; in N. 41° 47', W. 49° 29', at 5.35 p. m., passed two icebergs, seven hundred feet long and three hundred feet high, and five hundred feet long and three hundred and fifty feet high, respectively.

10th.—S. S. "Servia," in N. 42° 15', W. 49° 57', at 3.00 p. m., passed an iceberg.

11th.—S. S. "City of Rome," in N. 41° 40', W. 49° 50', passed a large iceberg about one hundred and fifty feet high.

12th.—S. S. "Iowa," in N. 41° 55', W. 47° 40', at 2.45 p. m., passed a small iceberg; in N. 41° 42', W. 48° 36', at 8 p. m., passed a large iceberg. S. S. "Ontario," in N. 42° 10', W. 47° 48', passed two icebergs. S. S. "Leerdam," in N. 47° 00', W. 42° 4', passed one large and two small icebergs.

13th.—S. S. "Leerdam," in N. 46° 56', W. 46° 26', passed a large iceberg and some small ice.

14th.—S. S. "Tower Hill," in N. 42° 50', W. 49° 40', passed three icebergs. S. S. "Leerdam," in N. 46° 11', W. 51° 23', passed a large iceberg about three hundred feet high.

15th.—S. S. "Adriatic," in N. 44° 47', W. 44° 36', passed a large iceberg. S. S. "Celtic," in N. 44° 37', W. 46° 9', at 9.00 a. m., passed a large iceberg; in N. 44° 35', W. 46° 20', at 10.30 a. m., passed another; in N. 44° 25', W. 47° 2', at 2.30 p. m., passed another. S. S. "Cephalonia," in N. 41° 47', W. 49° 12', at 4.45 p. m., passed an iceberg. S. S. "Richmond," between N. 45° 0', W. 46° 30', and N. 45° 30', W. 45° 0', passed twenty very large icebergs; temperature of water, 35°.

17th.—S. S. "Assyrian Monarch," in N. 44° 4', W. 43° 40', at 3.45 p. m., passed an iceberg about one hundred feet high. S. S. "Pavonia," in N. 44° 24', W. 45° 40', passed a large iceberg. S. S. "Buenos Ayrean," in N. 43° 0', W. 48° 35', at 9 a. m., passed a large iceberg, also, in N. 42° 50', W. 50° 34', at 5.00 p. m., passed a large iceberg. The schooner "Ulrich R. Smith," arrived at Saint John, New Brunswick, and reported having encountered heavy ice off Cape Ebrage and was obliged

to put back; the captain reports that as far as the eye could reach was seen a vast field of moving ice.

18th.—S. S. "Assyrian Monarch," in N. 42° 10', W. 47° 30', at 3.30 p. m., passed a large iceberg. S. S. "Pavonia," in N. 43° 4', W. 48° 29', passed a large iceberg. S. S. "Wisconsin," in N. 42° 20', W. 48° 10', at 4.00 p. m., passed a large iceberg.

19th.—S. S. "Alsatia," in N. 42° 48', W. 50° 25', passed a large iceberg; s. s. "State of Alabama," between N. 44° 50', W. 45° 6' and N. 44° 14', W. 45° 38', passed three large icebergs; ship "Jarlsberg," in N. 49° 0', W. 45° 0', was surrounded by icebergs during the 19th and 20th. The Newfoundland sealer "Young Prince" collided with an iceberg in the Gulf of Saint Lawrence and sank almost immediately.

20th.—S. S. "Baltic" in N. 43° 56', W. 46° 4', passed one mile north of a large iceberg and saw another bearing sw. eight miles distant; s. s. "Palestine," in N. 42° 40', W. 47° 38', at 5.0 p. m. passed an iceberg; ship "Cyrus Wakefield," in N. 46° 6', W. 41° 52', passed a large iceberg and much floating ice. A large iceberg was passed in N. 41° 55', W. 49° 43' and two others of moderate size in N. 42° 13', W. 48° 16', by the s. s. "Hammonia" which arrived at Hamburg, April 20.

21st.—S. S. "Baltic," in N. 42° 47', W. 50° 33', passed eight miles south of a large iceberg; s. s. "Grecian," in N. 42° 24', W. 47° 30', passed three icebergs.

22d.—S. S. "Britannic" in N. 45° 3', W. 47° 30', passed two large icebergs, also one small berg in N. 44° 44', W. 48° 40'.

23d.—S. S. "Aurania," in N. 44° 36', W. 45° 15', at 10.30 p. m., passed an iceberg; s. s. "Brooklyn City," in N. 45° 20', W. 43° 0', passed two large icebergs.

24th.—S. S. "Aurania," in N. 42° 55', W. 50° 50', at 1.00 p. m., passed an iceberg; s. s. "Circassia," in N. 45° 10', W. 41° 48', passed a large iceberg; in N. 44° 9', W. 45° 37', passed another; ship "Cyrus Wakefield," in N. 42° 6', W. 46° 9', passed two icebergs and some loose ice; s. s. "Wyoming," in N. 45° 20', W. 41° 47', passed a small iceberg.

25th.—S. S. "Noordland," in N. 43° 25', W. 41° 6', at 7 p. m. passed an iceberg about one thousand feet long and one hundred and fifty feet high; s. s. "State of Nevada," in N. 46° 43', W. 43° 9', at 12.30 p. m., passed an iceberg. The s. s. "Warwick," in N. 45° 0', W. 40° 8' at 6 p. m., passed a large iceberg; Captain Lobbett reports as follows: "this iceberg was about six hundred feet long and one hundred feet high, I consider it to have been uncommonly far east; we passed it within two miles on a bright, clear day; I should like to know if seen by other ships."

26th.—S. S. "State of Nevada," in N. 44° 21', W. 47° 15', at 11 a. m. passed a large iceberg; Captain Moodie reports: "the whole of it could not be seen for fog, but the portion visible was not less than a mile to a mile and a half long; it was table-shaped on top and from one hundred and eighty to one hundred and ninety feet high; in its vicinity several bergs were seen." S. S. "State of Nevada," in N. 43° 27', W. 48° 54', at 7 a. m., passed two icebergs from one hundred to one hundred and thirty feet high; s. s. "Venetian," in N. 44° 0', W. 47° 16', passed a small iceberg.

27th.—S. S. "City of Rome," in N. 45° 20', W. 44° 30', at 5 a. m. passed four icebergs from eighty to one hundred feet high, within a radius of fifteen miles; in N. 44° 55', W. 46° 10', at 11 a. m. passed a large iceberg about one hundred feet high; at 1.30 p. m. in N. 44° 40', W. 47° 0', passed a large, flat berg about thirty feet high; at 3.15 p. m. in N. 44° 30', W. 47° 35', passed an iceberg to the northward about six miles distant; s. s. "Adriatic," in N. 45° 5', W. 43° 0' passed an iceberg. The s. s. "Miranda," at Saint John's, Newfoundland, from New York, passed nine large icebergs on the passage.

28th.—S. S. "Rhaetia," in N. 44° 34', W. 41° 32', at 4 p. m., passed two icebergs about five hundred feet high, temperature of water 52°, air 57°; s. s. "Celtic," in N. 42° 52', W. 50° 25', at midnight passed a large iceberg.

29th.—S. S. "Catalonia," in N. 44° 09', W. 40° 34', at 2.46 a. m., passed a very large iceberg; s. s. "Rhaetia," in N. 42° 31', W. 47° 19', at 5 p. m., passed an iceberg about two hun-

dred feet high and three hundred feet long, temperature of air 38°, water 39°; s. s. "Elbe" in N. 42° 28', W. 47° 14', passed a large iceberg about three hundred feet long and seventy-five feet high; s. s. "Roman," in N. 44° 31', W. 41° 39', passed a large iceberg; s. s. "Celtic," in N. 42° 58', W. 48° 54', at 4.45 a. m., passed a large iceberg; about 1 p. m., in N. 43° 41', W. 46° 44', passed another; the s. s. "Illinois," in N. 44° 10', W. 39° 41', passed two small icebergs.

HALIFAX, April 29.—S. S. "Brooklyn," from Liverpool for Quebec and Montreal, arrived here this afternoon, having to put back on account of heavy ice in the gulf. She got as far as Cape Ray on Sunday.

30th.—S. S. "Etruria," in 45° 10', W. 41° 35', passed a large iceberg; s. s. "Wieland," in 44° 51', W. 41° 33', at noon passed an iceberg; at 1.50 p. m., in 44° 36', W. 41° 37', passed another; at 3.45 p. m., in N. 44° 23', W. 42° 06', passed another. The s. s. "Miranda" passed twelve large icebergs between Cape Ray and Cape Pine.

The following additional data are taken from the daily "Ice reports" of the "International Nautical Magazine":

3d.—S. S. "Cynthia," in N. 43°, W. 50°, passed several pieces of ice and about fifteen or twenty icebergs.

10th.—S. S. "Crystal," in N. 46° 40', W. 46° 30', passed two large icebergs.

11th.—S. S. "Martha," in N. 45° 20', W. 47° 20', passed several large icebergs.

12th.—S. S. "Martha," in N. 43° 30', W. 50° 45', saw a large iceberg about one hundred and fifty feet high and one mile long.

15th.—S. S. "Mary Louisa," in N. 44° 44', W. 47° 15', passed four icebergs.

17th.—S. S. "Suevia," in N. 42° 41', W. 48° 22', saw a large iceberg about one hundred feet high and two hundred and fifty feet long; also saw a medium-sized berg in N. 42° 27', W. 48° 59'.

19th.—S. S. "Edam," in N. 44° 30', W. 42° 00', passed one large iceberg about three hundred and fifty feet high and one and a half miles long.

20th.—S. S. "Edam," in N. 43° 35', W. 50° 20', passed a medium-sized iceberg.

24th.—S. S. "Monarch," in N. 44° 53', W. 45° 27', saw a small iceberg to the northward.

27th.—S. S. "Heckla," in N. 42° 30', W. 47° 55', passed two small icebergs.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York and Philadelphia and in the Custom House at Boston, where the necessary-blanks and other information will be furnished to shipmasters. In the January REVIEW was published an explanation of the object of these agencies.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were, during April, 1885, eleven reports cabled to that office from New York concerning storms and icebergs encountered by vessels in the Atlantic west of the forty-fifth meridian. Two messages were sent from Boston.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for April, 1885, is exhibited on chart ii. by the dotted isothermal lines; and in the table of miscellaneous meteorological data are given the means for the various stations of the Signal Service.

On chart iv. the departures from the normal temperature are graphically exhibited by lines connecting stations of equal departure, and in the table of miscellaneous meteorological data are given the departures for the several stations of the Signal Service.

In general the temperature throughout the country has differed but slightly from the normal. In the upper Mississippi valley and the lake region the month was slightly colder than

the average for April, the departures from the normal temperature being generally less than 2°; in South Carolina, Florida, the southern portions of Alabama and Georgia, and in portions of the southern plateau and southern slope, the mean temperatures have also been slightly below the normal. In all other districts the mean temperatures have been higher than the April normal, the departures being greatest (from 3° to 5°) at the northern Rocky mountain stations and in southern California.

In the following table are given the mean temperatures for the several geographical districts with the normals and departures, as deduced from the Signal Service observations:

Average temperatures for April, 1885.

Districts.	Average for April. Signal-Service ob- servations.		Comparison of April, 1885, with the average for several years.
	For sev- eral years.	For 1885.	
New England.....	43.4	45.0	+ 1.6
Middle Atlantic states.....	49.9	50.6	+ 0.7
South Atlantic states.....	61.2	61.2	0.0
Florida peninsula.....	72.3	71.0	- 1.3
Eastern Gulf states.....	65.0	65.4	+ 0.4
Western Gulf states.....	66.4	67.8	+ 1.4
Rio Grande valley.....	75.8	76.2	+ 0.4
Tennessee.....	58.5	60.1	+ 1.6
Ohio valley.....	53.5	53.5	0.0
Lower lake region.....	44.4	43.0	- 1.4
Upper lake region.....	39.2	37.6	- 1.6
Extreme northwest.....	38.4	40.1	+ 1.7
Upper Mississippi valley.....	50.7	50.4	- 0.3
Missouri valley.....	46.9	48.6	+ 1.7
Northern slope.....	42.0	45.1	+ 3.1
Middle slope.....	50.1	52.1	+ 2.0
Southern slope.....	62.8	63.1	+ 0.3
Southern plateau.....	57.9	59.3	+ 1.4
Middle plateau.....	48.3	50.0	+ 1.7
Northern plateau.....	49.3	52.1	+ 2.8
North Pacific coast region.....	50.2	51.7	+ 1.5
Middle Pacific coast region.....	57.0	59.9	+ 2.9
South Pacific coast region.....	61.5	64.3	+ 2.8
Mount Washington, N. H.....	20.9	23.0	+ 2.1
Pike's Peak, Colo.....	12.6	15.8	+ 3.2

RANGES OF TEMPERATURE.

The monthly and daily ranges of temperature at the various Signal Service stations are given in the table of miscellaneous meteorological data. The monthly ranges exceeded 60° at the most northerly stations from the extreme northwest eastward to New England, the greatest, 70°-1, 72°, and 77°-6, occurring at Rochester, New York, Mackinaw City, Michigan, and Saint Vincent, Minnesota, respectively. The monthly ranges were least on the Pacific coast, in Florida, and at stations on or near the west Gulf coast, the following being the smallest reported: Key West, Florida, 19°; Galveston, Texas, 23°-2; Tatoosh Island, Washington Territory, 25°-5; and Indianola, Texas, 26°-9.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for the several geographical districts, in the table of miscellaneous meteorological data, and on chart iv. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, 62°-3, is 1°-8 above the April average for the last three years.

Dakota.—Webster, Day county: mean temperature, 45°-6, is 3°-7 above the April average for the two preceding years.

Georgia.—Milledgeville: mean temperature, 63°-3, is slightly above the April average.

Illinois.—Sycamore, De Kalb county: mean temperature, 42°-6, is 4° below the April average for the three preceding years.

Riley, McHenry county: mean temperature, 42°-2, is 2° below the April average for the last twenty-four years.

Anna, Union county: mean temperature, 58°-5, is 0°-8 above the April average for the last ten years.

Mattoon, Coles county: mean temperature, 49°-0, is 4°-8 below the April average for the last five years.

Swanwick, Perry county: mean temperature, 54°-8, is 2°-2 below the April average for the four preceding years.

Indiana.—Logansport, Cass county: mean temperature, 51°-2, is 2°-7 below the April average for the last twenty-six years; the maximum temperature, 83°, is 19° lower than the highest maximum for that period, which occurred in 1870, and is 9° higher than the lowest maximum (1864); the minimum temperature, 24°, is 18° lower than the highest minimum (1870), and is 16° higher than the lowest minimum (1865).

Wabash, Wabash county: mean temperature, 47°-8, is 2°-3 below the April average for the last nine years.

Vevay, Switzerland county: mean temperature, 50°-0, is 0°-2 above the April average for the last twenty-one years; the maximum temperature, 85°, and the minimum, 30°, are 1°-4 and 1°-5 above the respective averages.

Kansas.—Yates Centre, Woodson county: mean temperature, 54°-7, is 1°-2 above the April average for the last five years.

Independence, Montgomery county: mean temperature, 56°-5, is 0°-6 below the April average for the last fourteen years.

Wellington, Sumner county: mean temperature, 54°-5, is 0°-9 below the April average for the last seven years.

Emporia, Lyon county: mean temperature, 54°-2, is 0°-5 above the April average for the last five years.

Maine.—Gardiner, Kennebec county: mean temperature, 42°-0, is 0°-6 above the April average for a period of forty-nine years.

Maryland.—Fallston, Harford county: mean temperature, 50°-0, is 0°-5 above the April average for the last fourteen years.

Massachusetts.—Somerset, Bristol county: mean temperature, 48°-1, is 2°-5 above the April normal.

Michigan.—Thornville, Lapeer county: mean temperature, 44°-4, is about the April normal.

Ann Arbor, Washtenaw county: mean temperature, 42°-6, is about the April normal.

Missouri.—Saint Louis: mean temperature, 56°-8, is 0°-5 above the April average for the last forty-eight years.

Nevada.—Carson City: mean temperature 50°-0, is 2°-3 above the April average.

New Jersey.—South Orange, Essex county: mean temperature, 48°-0, is 0°-2 below the April average for the last fifteen years.

New York.—Cooperstown, Otsego county: mean temperature, 40°-3, corresponds to the April normal for a period of thirty-five years.

Palermo, Oswego county: mean temperature, 38°-0, is 3°-1 below the April average for the last thirty-two years.

North Volney, Oswego county: mean temperature, 39°-2, is 1°-8 below the April average for the last eighteen years.

Ohio.—Wauseon, Fulton county: mean temperature, 45°-3, is 0°-8 below the April average for the last fifteen years.

Texas.—New Ulm, Austin county: mean temperature, 69°-3, is 0°-9 above the April average for the last thirteen years.

Vermont.—Woodstock, Windsor county: mean temperature, 41°-5, is 2° above the April average for the last eighteen years.

Virginia.—Wytheville, Wythe county: mean temperature, 52°-6, is 0°-6 above the April average for a period of twenty-one years.

Variety Mills, Nelson county: mean temperature, 55°-1, is 1°-1 above the April average for the last eight years.

Bird's Nest, Northampton county: mean temperature, 56°-5, is 1°-7 above the April normal.

West Virginia.—Helvetia, Randolph county: mean temperature, 47°-3, is 1° below the April average for the last nine years.

SPRING SEASON OF 1885.

The following notes relating to the spring season of 1885, have been received:

Boonville, Oneida county, New York, 10th: the maple sugar harvest is four weeks later than usual.

Lynchburg, Virginia, 17th: the season is three weeks later than usual; cold weather has so retarded the growth of grass that the pasturage in the southwestern counties of the state is very poor.

Boisé City, Idaho, 19th: the spring season has been unusually mild and all kinds of vegetation are well advanced.

Ann Arbor, Washtenaw county, Michigan, 30th: all vegetation is from three to four weeks late.

Guttenberg, Clayton county, Iowa, 30th: this has been a late

spring; at the close of the month there are no signs of leaves putting out.

Sussex, Waukesha county, Wisconsin, 30th: the spring season of 1885 is the most backward known for many years; agricultural operations are much belated and the prospects for the wheat crop are very unfavorable.

Oroville, Butte county, California, 30th: the season is much more advanced than usual at this time of the year.

Greensborough, Hale county, Alabama, 30th: the spring season is at least one month later usual.

Table of comparative maximum temperatures for the month of April.

State or Territory.	Maximum for April, 1885, Signal Service.		Maximum since Signal-Service stations were opened—3 to 14 years.			Highest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
Alabama.....	Mobile.....	86.1	Mobile.....	90	1851, 1883	Mount Vernon Arsenal.....	95	.....	Years.
Do.....	Montgomery.....	86.1	Montgomery.....	90	1880	Mobile.....	85	.....	34
Arizona.....	Yuma.....	96.4	Yuma.....	105	1876	Fort Lowell.....	85	.....	34
Do.....	Prescott.....	80.0	Prescott.....	86	1879	Fort McDowell.....	109	1879	12
Arkansas.....	Fort Smith.....	84.4	Fort Smith.....	88.5	1883	Fort Smith.....	96	.....	21
Do.....	Little Rock.....	85.8	Little Rock.....	94	1880	Little Rock.....	84	.....	26
California.....	San Francisco.....	75.0	San Francisco.....	81	1875	Presidio.....	82	.....	27
Do.....	Los Angeles.....	88.6	Los Angeles.....	94	1881	Fort Yuma.....	106	.....	31
Colorado.....	Denver.....	71.1	Denver.....	83	1874	Fort Lyon.....	98	.....	21
Do.....	Pike's Peak.....	38.2	Pike's Peak.....	39	1876	Fort Garland.....	80	.....	22
Connecticut.....	New Haven.....	83.0	New Haven.....	75	1880	New Haven.....	85	.....	86
Do.....	New London.....	77.9	New London.....	74	1880	Fort Trumbull.....	82	.....	48
Dakota.....	Yankton.....	76.7	Yankton.....	89	1874	Fort Sully.....	98	.....	17
Do.....	Fort Buford.....	75.0	Fort Buford.....	92	1881	Fort Randall.....	95	.....	23
Delaware.....	Delaware Breakwater.....	79	Delaware Breakwater.....	79	1880	Fort Delaware.....	85	.....	45
District of Columbia.....	Washington City.....	86.3	Washington City.....	90	.....	Washington City.....	91	.....	49
Florida.....	Pensacola.....	84.0	Pensacola.....	87.2	1883	Fort Barrancas.....	85	.....	53
Do.....	Key West.....	86.4	Key West.....	91	1881	Key West.....	91	.....	44
Georgia.....	Augusta.....	92.8	Augusta.....	90	1880	Augusta Arsenal.....	94	.....	50
Do.....	Savannah.....	86.7	Savannah.....	89	1873	Savannah.....	94	.....	37
Idaho.....	Lewiston.....	81.4	Lewiston.....	86	1880	Fort Lapwai.....	85	.....	19
Do.....	Boisé City.....	74.0	Boisé City.....	80	1879	Fort Boise.....	83	.....	11
Illinois.....	Chicago.....	76.0	Chicago.....	83	1873	Chicago.....	84	.....	38
Do.....	Cairo.....	81.0	Cairo.....	89	1875	Rock Island Arsenal.....	89	.....	11
Indiana.....	Indianapolis.....	78.3	Indianapolis.....	85.3	1883	Vevay.....	97	.....	14
Do.....	Fort Sill.....	87.0	Fort Sill.....	96	1880	Fort Sill.....	97	.....	10
Do.....	Fort Reno.....	87.7	Fort Gibson.....	93	1881	Fort Gibson.....	95	.....	47
Iowa.....	Des Moines.....	76.5	Des Moines.....	89	1883	Muscatine.....	86	.....	27
Do.....	Dubuque.....	73.9	Dubuque.....	84	1879	Iowa City.....	90	.....	15
Kansas.....	Leavenworth.....	77.0	Leavenworth.....	89	1880	Fort Leavenworth.....	102	.....	53
Do.....	Dodge City.....	79.0	Dodge City.....	93	1880	Fort Larned.....	96	.....	18
Kentucky.....	Louisville.....	83.2	Louisville.....	88.5	1883	Newport Barracks.....	89	.....	30
Louisiana.....	New Orleans.....	83.2	New Orleans.....	86	1882	New Orleans.....	91	.....	51
Do.....	Shreveport.....	92.1	Shreveport.....	93	1880, 1882	Baton Rouge.....	96	.....	53
Maine.....	Eastport.....	66.2	Eastport.....	63	1877	Fort Preble.....	90	.....	60
Do.....	Portland.....	71.9	Portland.....	78	1881	Gardiner.....	85	.....	34
Maryland.....	Baltimore.....	81.5	Baltimore.....	84	1881	Baltimore.....	88	.....	37
Do.....	Boston.....	82.4	Boston.....	80	1881	Fort Washington.....	93	.....	38
Massachusetts.....	Boston.....	82.4	Boston.....	80	1881	Williamstown.....	87	.....	62
Do.....	Springfield.....	79.1	Springfield.....	79	1881	New Bedford.....	80	.....	58
Michigan.....	Port Huron.....	79.6	Port Huron.....	81.4	1883	Fort Gratiot.....	94	.....	22
Do.....	Detroit.....	77.0	Detroit.....	78.5	1883	Detroit.....	90	.....	35
Minnesota.....	Saint Vincent.....	65.2	Saint Vincent.....	73	1881	Fort Ridgely.....	90	.....	11
Do.....	Saint Paul.....	73.5	Saint Paul.....	82	1879, 1882	Fort Snelling.....	85	.....	61
Mississippi.....	Vicksburg.....	87.0	Vicksburg.....	90	1881	Vicksburg.....	85	.....	4
Missouri.....	Saint Louis.....	79.0	Saint Louis.....	87.5	1883	Saint Louis.....	93	.....	38
Montana.....	Fort Shaw.....	75.5	Fort Shaw.....	80	1880	Fort Shaw.....	93	.....	13
Do.....	Fort Benton.....	79.3	Fort Benton.....	81	1880	Fort Benton.....	93	.....	15
Nebraska.....	North Platte.....	75.0	North Platte.....	82	1880	Fort McPherson.....	90	.....	26
Do.....	Omaha.....	77.2	Omaha.....	89	1880	Omaha.....	96	.....	3
Nevada.....	Winnemucca.....	73.9	Winnemucca.....	79	1881	Fort McDermitt.....	90	1881	10
Do.....	Pioche.....	80	Pioche.....	80	1879	Camp Winfield Scott.....	86	.....	4
New Hampshire.....	Mount Washington.....	56.5	Mount Washington.....	50	1883	Fort Constitution.....	85	.....	34
New Jersey.....	Sandy Hook.....	80.5	Sandy Hook.....	77	1880	Vineland.....	88	1881	7
Do.....	Atlantic City.....	75.2	Atlantic City.....	79	1878	Burnt Mills.....	88	1877	25
New Mexico.....	Santa Fé.....	70.0	Santa Fé.....	84	1879	Santa Fé.....	91	.....	25
Do.....	Albany.....	84.6	Albany.....	80	1881	Fort Craig.....	104	.....	25
New York.....	Buffalo.....	81.5	Buffalo.....	82.6	1881	Albany.....	88	.....	55
Do.....	Wilmington.....	83.7	Wilmington.....	90	1880	Fort Niagara.....	94	.....	54
North Carolina.....	Charlotte.....	84.8	Charlotte.....	85	1880, 1881	Fort Johnson.....	88	.....	37
Do.....	Cincinnati.....	81.9	Cincinnati.....	85	1872, 1873	Fort Macon.....	86	.....	16
Ohio.....	Cleveland.....	83.3	Cleveland.....	85	1872, 1883	Cincinnati.....	93	.....	36
Do.....	Portland.....	82.0	Portland.....	85	1880	Marietta.....	90	.....	53
Oregon.....	Roseburg.....	81.9	Roseburg.....	84.5	1880	Fort Dalles.....	90	.....	20
Pennsylvania.....	Philadelphia.....	86.8	Philadelphia.....	87	1872	Astoria.....	82	.....	120
Do.....	Pittsburg.....	89.2	Pittsburg.....	88	1878	Allegheny Arsenal.....	86	.....	32
Rhode Island.....	Block Island.....	69.9	Block Island.....	62	1883	Providence.....	82	.....	35
South Carolina.....	Charleston.....	83.9	Charleston.....	86.4	1884	Charleston.....	88	.....	105
Tennessee.....	Memphis.....	83.8	Memphis.....	88	1883	Ashwood.....	89	1880	11
Do.....	Knoxville.....	81.2	Knoxville.....	88	1872	Glenwood Cottage.....	89	.....	28
Texas.....	San Antonio.....	88.8	San Antonio.....	96	1880	San Antonio.....	96	.....	32
Do.....	Rio Grande City.....	96.5	Rio Grande City.....	109	1878	Fort Ringgold.....	114	1878	3
Utah.....	Salt Lake City.....	72.4	Salt Lake City.....	83	1874	Salt Lake City.....	80	.....	17
Vermont.....	Burlington.....	75	Burlington.....	75	1881	Lunenburg.....	78	.....	55
Virginia.....	Norfolk.....	81.4	Norfolk.....	92	1871	Fortress Monroe.....	91	.....	11
Do.....	Lynchburg.....	84.9	Lynchburg.....	91.5	1873	Alexandria.....	92	.....	19
Washington Territory.....	Port Angeles.....	66.9	Olympia.....	82	1880	Fort Vancouver.....	82	.....	14
Do.....	Dayton.....	78.5	Dayton.....	91	1880	Fort Walla Walla.....	96	.....	2
West Virginia.....	Morgantown.....	89	Morgantown.....	89	1878	Wellsburg.....	88	1879	26
Wisconsin.....	La Crosse.....	73.7	La Crosse.....	85	1879	Fort Crawford.....	91	.....	31
Do.....	Milwaukee.....	77.2	Milwaukee.....	82	1871	Fort Howard.....	87	.....	27
Wyoming.....	Cheyenne.....	65.4	Cheyenne.....	80	1874	Fort Laramie.....	89	.....	27

FROSTS.

Frosts are reported to have occurred in the various districts on the following dates:

New England.—2d, 4th to 20th, 27th to 30th, and on the summit of Mount Washington, New Hampshire, 1st to 9th, 12th to 17th, 26th to 30th.

Middle Atlantic states.—1st to 20th, 23d, 27th, 29th, 30th.

South Atlantic states.—1st, 5th, 9th to 14th, 17th, 18th, 21st, 30th.

Eastern Gulf states.—4th, 5th, 9th, 10th, 11th, 13th, 14th.

Western Gulf states.—4th, 10th, 12th, 13th.

Tennessee.—4th, 5th, 9th, 10th, 13th, 14th.

Ohio valley.—1st, 3d to 6th, 9th to 15th, 19th, 25th, 27th, 29th, 30th.

Lower lake region.—1st to 19th, 25th, 27th to 30th.

Upper lake region.—Daily, except 21st.

Extreme northwest.—1st to 5th, 7th to 13th, 15th, 18th, 23d, 24th, 27th to 30th.

Upper Mississippi valley.—1st to 4th, 7th to 13th, 23d, 24th, 27th, 28th, 29th.

Missouri valley.—1st to 5th, 7th to 15th, 17th, 18th, 19th, 21st, 23d to 26th, 28th.

Northern slope.—Daily, except 2d and 14th.

Middle slope.—2d, 3d, 4th, 6th to 10th, 12th, 13th, 15th, 16th, 20th, 22d, 24th to 30th.

Southern slope.—Fort Davis, Texas, 23d; Fort Elliott, Texas, 25th.

Southern plateau.—7th, 9th, 15th, 17th, 21st to 25th, 29th, 30th.

Middle plateau.—1st, 3d to 9th, 12th, 14th to 25th, 27th.

Northern plateau.—2d to 8th, 10th, 13th, 16th to 25th, 28th, 29th, 30th.

North Pacific coast region.—2d, 6th, 7th, 8th, 15th to 20th, 22d, 24th.

Middle Pacific coast region.—2d, 15th to 23d.

The following reports of damage to vegetation by frosts during April have been received:

East Portland, Oregon: strawberries were damaged to some extent by the frost on the 6th.

Augusta, Georgia: the frost of the 13th caused damage to young vegetation in the surrounding country.

Savannah, Georgia: a killing frost occurred in the lowlands in this vicinity on the 13th.

Knoxville, Tennessee: a heavy frost, injuring fruit and early vegetables, occurred on the 14th.

Tower House, Shasta county, California: the frosts of the 17th, 18th, and 19th were very damaging to fruit in the surrounding country.

Ashland, Oregon: the frost on the 18th caused slight damage to fruits; vegetation was much further advanced than usual at this season.

Red Bluff, California: the light frost on the 18th killed vegetables, vines, etc., on the foot hills.

Santa Rosa, Sonoma county, California: the frost on the 18th was the most severe for this season of the year that has occurred since 1875; all kinds of fruit were damaged.

Glen Ellen, Sonoma county, California: frost occurred in this vicinity on the morning of the 18th; it is feared that the grape crop was seriously injured.

Stockton, San Joaquin county, California: a heavy frost occurred in portions of this county on the 18th, causing damage to vineyards and gardens.

Saint Helena, Napa county, California: several frosts occurred in some parts of Napa valley on the 18th; in the lowlands the grapevines were damaged.

Tacoma, Pierce county, Washington Territory: frosts occurred on the 7th and 8th and from the 16th to 20th; these caused some damage to fruit and tender plants.

Boisé City, Idaho: on the 19th a heavy frost occurred; the temperature fell to 28°; it is reported that from fifty to seventy-five per cent. of the fruit blossoms were killed, and the damage is estimated at from \$25,000 to \$50,000. The

spring season was unusually advanced and consequently the damage to vegetation was very great.

Dayton, Washington Territory: on the 20th a heavy frost occurred and the temperature fell to 22° 3, being the lowest recorded since January; all kinds of early vegetation were destroyed; locust, cherry, and maple leaves were blackened and fell from the trees.

San Carlos, Arizona: the frost on the morning of the 21st caused a large amount of damage to crops in this vicinity.

ICE.

Ice formed in the southern parts of the country as follows:

California.—Blue Lake, 18th, ice formed about one quarter of an inch in thickness, causing much damage to the fruit.

Arizona.—Prescott, 21st, 24th.

Georgia.—Augusta, 14th.

North Carolina.—Charlotte, 11th, 14th, Lenoir, 9th, New River Inlet, 11th; Weldon, Raleigh and Statesville, 14th.

Tennessee.—Austin and Chattanooga, 14th.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada, for the month of April, 1885, as determined from reports from more than seven hundred stations, is exhibited on chart iii.

In the following table are shown, for each of the geographical districts, as deduced from Signal Service observations, the average April precipitation for a series of years; the average for April, 1885, and the departures from the normal.

Average precipitation for April, 1885.

Districts.	Average for April. Signal-Service observations.		Comparison of April, 1885, with the average for several years.
	For several years.	For 1885.	
	Inches.	Inches.	Inches.
New England.....	3.60	3.13	-0.47
Middle Atlantic states.....	3.69	1.81	-1.88
South Atlantic states.....	4.64	2.16	-2.48
Florida peninsula.....	2.61	0.62	-1.99
Eastern Gulf states.....	5.87	4.32	-1.55
Western Gulf states.....	4.60	5.83	+1.23
Rio Grande valley.....	0.75	1.58	+0.83
Tennessee.....	5.82	2.57	-3.25
Ohio valley.....	3.50	3.73	+0.23
Lower lake region.....	2.36	2.44	+0.08
Upper lake region.....	2.02	1.98	-0.04
Extreme northwest.....	1.86	2.42	+0.56
Upper Mississippi valley.....	2.97	3.42	+0.45
Missouri valley.....	3.08	4.19	+1.11
Northern slope.....	1.61	1.45	-0.16
Middle slope.....	1.34	2.61	+1.27
Southern slope.....	1.37	1.99	+0.62
Southern plateau.....	0.48	0.41	-0.07
Middle plateau.....	1.74	2.34	+0.60
Northern plateau.....	1.80	0.15	-1.65
North Pacific coast region.....	3.58	0.88	-2.70
Middle Pacific coast region.....	3.00	1.49	-1.51
South Pacific coast region.....	0.98	1.09	+0.11
Mount Washington, N. H.....	4.28	2.66	-1.62
Pike's Peak, Colo.....	3.32	5.39	+2.07

In the districts on the Atlantic coast, the east Gulf states, Tennessee, southern Michigan, Wisconsin, and northeastern Minnesota, the precipitation has been below the average for April; it has also been below the average in southern Dakota, western Nebraska, Montana, in the western plateau districts, and on the Pacific coast, except in southern California, where there was a slight excess. The most marked deficiencies are shown in the Florida peninsula and north Pacific coast region, where there was only about one-fourth of the average precipitation, and in the middle and south Atlantic states, Tennessee, and the middle Pacific coast region, where it was about one-half of the average. In the Ohio and lower Missouri valleys, west Gulf states, middle and southern slopes, the extreme northwest, southern California, and the northern part of the lake region, the precipitation has been above the average, the excess being greatest in the Middle slope, Missouri valley and west Gulf states.

In the table of miscellaneous meteorological data are given the departures from the average at the various Signal Service stations.

Table of excessive, and greatest monthly precipitation—April, 1885.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.			Date.	Amt.	
<i>Alabama.</i>				<i>Kansas—Con'd.</i>			
Tuscaloosa.....	30	5.25	9.78	Leavenworth.....			6.63
Mount Vernon Bk.....	7, 8	5.80	8.15	Wyandotte.....			6.00
Bolling.....	7	3.00	7.12	Independence.....	21	3.28	
Do.....	30	2.13		<i>Louisiana.</i>			
Clintonville.....	7, 8	6.12	6.15	Point Pleasant.....	2	6.02	19.58
Mobile.....	7, 8	3.45		Do.....	5, 6, 7	12.25	
Greenville.....	7, 8	2.90		Shreveport.....	22, 23	4.61	7.07
Mount Willing.....	7, 8	2.00		<i>Maine.</i>			
Newton.....	7, 8	3.00		Eastport.....	29	2.75	
Prattville.....	29, 30	2.00		<i>Minnesota.</i>			
<i>Arkansas.</i>				Pleasant Hill.....			10.05
Mount Ida.....	22	4.00	8.60	Independence.....			7.65
Do.....	29, 30	2.60		Graham.....			7.64
Fort Smith.....	22	4.30	7.63	Carrollville.....			7.46
Little Rock.....			6.03	Carrollville.....			7.38
Lead Hill.....	22	3.82		Miami.....			7.25
<i>California.</i>				Pierce City.....	21, 22	3.00	6.80
Alcatraz Island.....	7, 8	2.35		Lamar.....	21, 22	3.22	6.64
Presidio of S. F.....	6, 7, 8	3.00		Lamonte.....			6.25
San Francisco.....	7, 8	3.55		Louisiana.....			6.00
<i>Colorado.</i>				<i>Nebraska.</i>			
Pike's Peak.....	22, 23	3.50		De Witt.....			6.50
Denver.....	22, 23	2.79		Omaha.....	20, 21	2.54	6.34
<i>Dakota.</i>				York.....			6.25
Webster.....	6	4.32	6.33	Marquette.....	20, 21	2.74	
Fort Pembina.....	22	2.00		Genoa.....	19, 20	2.60	
Fort A. Lincoln.....	22	3.14		<i>Nevada.</i>			
Bismarck.....	20, 21	2.43		Carson City.....	3	2.50	
Deadwood.....	20, 21	2.10		<i>New York.</i>			
Yankton.....	19, 20, 21	4.65		White Plains.....	28, 29	2.85	6.63
<i>Florida.</i>				<i>Ohio.</i>			
Fort Barrancas.....	2, 3	4.32	8.90	Oberlin.....	24	3.00	
Do.....	7, 8	3.63		<i>Tennessee.</i>			
Pensacola.....	7, 8	2.69		Dyersburg.....	17	3.82	6.15
<i>Illinois.</i>				Sweet Water.....	17	2.00	
Springfield.....			6.36	Riddleton.....	28	2.06	
Mattoon.....	15, 16	2.16	6.20	<i>Texas.</i>			
<i>Indiana.</i>				Honey Grove.....	5	2.30	8.60
Marengo.....			8.30	Do.....	21	3.75	
<i>Iowa.</i>				Comfort.....	21, 22	4.68	8.34
Cedar Rapids.....	30	2.05	7.82	Huntsville.....	5, 6	2.05	7.45
<i>Kansas.</i>				Do.....	22, 23	2.92	
Elk Falls.....	14	4.00	11.50	Cleburne.....	5, 6	2.61	6.41
Do.....	21	2.00		Do.....	21, 22	2.25	
Do.....	30	2.00		New Ulm.....	22, 23	3.06	
Sterling.....	19, 20	7.77	10.86	Palatine.....	22	2.09	
West Leavenworth.....	6, 7	2.50	8.90	Indianola.....	22, 23	2.57	
Fort Scott.....	21, 22	4.95	8.73	Do.....	24, 25	2.08	
Oswego.....	22	5.18	8.32	Galveston.....	23	2.64	
Maud.....	20, 21	3.28	7.50	Fort Elliott.....	20, 21	2.44	
Salina.....	20	2.02	7.03	<i>Virginia.</i>			
Westmoreland.....			7.01	Blacksburg.....	6, 7	2.40	

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by reports from the regular Signal Service stations are shown in the table of average precipitation for the several geographical districts and also in the table of miscellaneous meteorological data. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 5.38, is 0.62 in excess of the April average for the three preceding years.

Connecticut.—Hartford: monthly precipitation, 3.08, is 0.10 below the April average for the last thirteen years.

Dakota.—Webster, Day county: monthly precipitation, 6.33, is 3.61 above the April average for the two preceding years.

Georgia.—Milledgeville: monthly precipitation, 0.98, is about 4.00 below April average.

Forsyth, Monroe county: monthly precipitation, 1.65, is the least recorded in April during the last twelve years.

Illinois.—Sycamore, De Kalb county: monthly precipitation, 4.31, is 0.21 below the April average for the three preceding years.

Anna, Union county: monthly precipitation, 2.69, is 1.41 below the April average for the last ten years.

Mattoon, Coles county: monthly precipitation, 6.20, is 2.33 in excess of the April average.

Swanwick, Perry county: monthly precipitation, 2.91 is about the average for April for the last four years.

Indiana.—Logansport, Cass county: monthly precipitation,

3.74, is 0.16 above the April average for the last twenty-six years.

Vevay, Switzerland county: monthly precipitation, 4.69 is 1.16 in excess of the April average.

Wabash, Wabash county: monthly precipitation, 4.07, is 1.11 above the April average for the last nine years.

Kansas.—Yates Centre, Woodson county: monthly precipitation, 5.33, is 3.62 above the April average for the last five years.

Emporia, Lyon county: monthly precipitation, 5.70, is 3.24 above the April average for the last five years.

Wellington, Sumner county: monthly precipitation, 4.84, is 2.83 above the April average for the last seven years.

Independence, Montgomery county: monthly precipitation, 5.12, is 1.60 above the April average for the last thirteen years.

Maryland.—Fallston, Harford county: monthly precipitation, 1.60, is 1.57 below the April average for the last fourteen years, and is the smallest recorded in April during that period.

Massachusetts.—Somerset, Bristol county: monthly precipitation, 2.31, is 1.87 below the April average.

Worcester, Worcester county: monthly precipitation, 2.83, is slightly below the April average for a period of forty-seven years.

Missouri.—Saint Louis: monthly precipitation, 4.28, is 0.58 in excess of the April average for the last forty-eight years.

Nevada.—Carson City: monthly precipitation, 3.41, is 1.40 in excess of the April average.

New Jersey.—South Orange, Essex county: monthly precipitation, 1.30, is 2.96 below the April average for the last fifteen years.

New York.—Palermo, Oswego county: monthly precipitation, 1.00, is 1.10 below the April average for the last thirty-two years.

North Volney, Oswego county: monthly precipitation, 2.40, is 0.28 above the April average for the last thirteen years.

Ohio.—Wauseon, Fulton county: monthly precipitation, 3.71, is 1.34 above the April average for the last twelve years.

Vermont.—Woodstock, Windsor county: monthly precipitation, 1.98, is 0.45 below the April average for the last sixteen years.

Virginia.—Wytheville, Wythe county: monthly precipitation, 2.19, is 1.35 below the April normal for a period of twenty-one years.

Variety Mills, Nelson county: monthly precipitation, 1.39, is 1.48 below the April average for the last six years.

Washington Territory.—Bainbridge Island: monthly precipitation, 0.25, is the least recorded in April during the last seven years; the precipitation for April during that period has varied from 2.50 to 6.00.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 5.04, is 1.16 below the April average for the last nine years.

SNOW.

The dates on which snow fell in the various states and territories are as follows:

Arizona.—Fort Apache, 20th; Prescott, 28th.

California.—Fort Bidwell, 16th, 17th, 18th; Fort Gaston, 16th.

The observer at Red Bluff reports a heavy snow-storm on the mountains west of station at 7 p. m. on the 12th, and a heavy snow-storm on the mountains east of station on the 18th.

The observer at Los Angeles reports that on the 29th the tops of the mountains east of station were covered with snow which fell during the preceding night. The peaks had been free from snow during the greater part of the month.

Colorado.—Pike's Peak, 4th, 5th, 6th, 12th to 16th, 18th, 22d to 24th, 26th, 30th; at the other places in the state on the 5th, 6th, 15th, 20th to 24th, 26th.

Connecticut.—4th, 11th, 28th, 29th.

Dakota.—1st, 2d, 6th to 11th, 13th, 15th, 17th to 22d, 25th to 28th, 30th.

Delaware.—13th.

District of Columbia.—11th.
Idaho.—15th.
Illinois.—9th, 11th to 14th.
Indiana.—12th, 13th, 14th.
Indian Territory.—Fort Reno, 21st, 24th, 29th.
Iowa.—4th, 8th, 9th, 11th, 12th, 16th.
Kansas.—24th.
Kentucky.—12th, 14th.
Maine.—2d, 4th to 7th, 12th, 13th, 26th, 27th.
Maryland.—10th to 13th, 15th.
Massachusetts.—2d, 11th to 14th, 26th, 29th.
Michigan.—1st, 2d, 3d, 5th, 8th to 15th, 24th, 27th, 28th.
Minnesota.—1st to 4th, 7th, 10th, 12th, 24th, 26th, 27th, 30th.
Missouri.—9th.
Montana.—10th, 16th to 23d, 25th to 28th.
Nebraska.—8th, 9th, 28th.
Nevada.—Winnemucca, 17th, 18th; Fort McDermitt, 17th; Carson City, 3d.
New Hampshire.—Mount Washington, 5th, 6th, 7th, 12th, 13th, 14th, 26th to 29th; at other places in the state from the 10th to 14th, 26th, 28th, 29th.
New Jersey.—9th, 11th, 29th.
New Mexico.—Santa Fe, 6th, 20th, 21st, 23d, 24th, 26th; Fort Union, 23d.
New York.—1st to 9th, 11th to 15th, 25th, 26th, 28th, 29th.
North Carolina.—Raleigh and Weldon, 10th, Asheville and Lenoir, 13th.
Ohio.—9th, 11th to 16th.
Oregon.—16th to 19th, 26th, 28th.
Pennsylvania.—3d, 4th, 9th to 15th, 28th, 29th.
Rhode Island.—Nyatt Point, 15th.
Tennessee.—Knoxville, 13th.
Utah.—Salt Lake City, 22d, 23d; Nephi, 21st.
Vermont.—3d to 6th, 12th, 13th, 14th, 26th, 28th, 29th.
Virginia.—9th to 13th.
West Virginia.—Wellsburg, 3d, 9th, 11th, 12th.
Wisconsin.—1st to 4th, 9th, 10th, 12th, 14th, 17th, 19th to 26th, 27th.
Wyoming.—7th, 8th, 20th to 23d, 27th, 28th, 29th.

The following notes relate to the severest snowstorms of the month.

Toronto, Ontario: a severe snowstorm prevailed throughout Ontario on the 3d; about eight inches of snow fell at Toronto.

Deadwood, Dakota: heavy snow began at 4.58 a. m. on the 21st, and continued all day; the snowfall blockaded all the roadways in this vicinity and caused delay of the mails. The snow blockade continued until the afternoon of the 23d.

Denver, Colorado, 22d: rain began at 3.53 p. m. and continued until 9 p. m., when it changed to snow which fell steadily until 5.25 a. m. on the 23d, there being a depth of twenty inches on the ground when the storm ended. The total depth was about twenty-three inches. This is considered the most severe storm that has occurred at Denver for a number of years. As the snow was very moist and heavy it resulted in much damage to roofs of buildings, trees, etc., which were broken down under its weight. During the morning of the 23d the streets of the city were impassable and business was almost entirely suspended. Railway trains were delayed several hours. The damage caused by this storm is estimated at \$60,000.

Georgetown, Colorado, 23d: the snow storm of the past few days has been of great severity. The fall of snow, about three feet, was the heaviest that has occurred since 1876. Travel on the railroads was suspended.

Idaho Springs, Colorado, 24th: the snow storm which began at about noon on the 22d and continued for twenty-four hours was unusually severe. Snow fell to a depth of thirty-two inches, which is the heaviest snowfall that has occurred since May 9th, 1867, when it fell to a depth of thirty-eight inches. Travel on the railroads and roadways was suspended for thirty-six hours.

MONTHLY SNOW-FALLS.

[Expressed in inches and tenths.]

Monthly snow-falls of two inches or more were reported from the various states and territories during the month as follows:

California.—Summit, 38; Cisco, 22; Boca, 15; Truckee, 14; Emigrant Gap, 12; Alta, 10.

Colorado.—Pike's Peak, 32.6; Denver, 31.

Connecticut.—North Colebrook, 3 to 4.

Dakota.—Deadwood, 28.8; Richardton, 24; Fort Totten, 8.4; Fort Buford, 5.1.

Illinois.—Sandwich, 2.8; Sycamore, 2.3; Chicago, 2.

Iowa.—Keokuk, 3.6; Des Moines, 2.6; Indianola, 2.5.

Kansas.—Sherlock, 4.

Maine.—Cornish, 8; Orono, 3.5; Eastport, 3; Belfast, 2.

Maryland.—Fallston, 2 to 3; Baltimore, 2.

Massachusetts.—Rowe, 5.

Michigan.—Hudson, 39.3; Moorestown, 23; Alpena, 20.3; Boyne, 16; Marquette, 14.3; Thornville, 14; Escanaba, 13.4; Swartz Creek, 9.6; Harrisville, 9.5; Ionia and Manistique, 8.8; Lansing, 8.5; Detroit, 8.1; Ann Arbor, 7.7; Mottville and Port Huron, 4; Traverse City and Northport, 3.

Minnesota.—Saint Vincent, 18.2; Minneapolis, 2.2.

Montana.—Fort Custer, 12; Fort Maginnis, 9.7; Helena, 9.1; Fort Shaw, 5.7; Fort Benton, 5.4; Fort Assinaboine, 2.6.

Nebraska.—Yutan, 2.5.

Nevada.—Battle Mountain, 6; Wells, 4.5; Otego, 3.5; Halleck, 3; Palisade, 2.2; Elko and Carson City, 2.

New Hampshire.—Mount Washington, 5; Antrim, 4.

New Mexico.—Santa Fé, 5.8.

New York.—Rochester, 19.5; Buffalo, 15.7; Humphrey, 15.5; Le Roy, 14.6; Penn Yan, 7; Oswego, 6.6; Cooperstown, Auburn, and Ithaca, 6; Palermo, 4.2; Albany, 3.1.

Ohio.—Garrettsville, 10.2; Hiram, 7; Ruggles, 5; North Lewisburg, 3; Toledo, 2.5; Sandusky, 2.

Pennsylvania.—Grampian Hills, 12; Dyberry, 9; Erie, 8.2; Blooming Grove, 6.5; Wellsboro, 4.6; Drifton, 4.2; Pittsburg, 4.1; Mahanoy Plane, 4; Chambersburg, 2.5; Troy, 2.2.

Utah.—Nephi, 6.8.

Vermont.—Strafford, 9.5; Dorset, 6.5; Lunenburg, 4; Newport, 3.4; Chelsea, 3.2; Burlington, 3; Woodstock, 2.5.

Virginia.—Blacksburg, 2.5; Dale Enterprise, 2.

West Virginia.—Helvetia, 10.5.

Wisconsin.—Wausau, 18.5; Franklin, 12; Embarras, 10; Neillsville, 8.2; Manitowoc, 3.2; Madison, 2.

Wyoming.—Cheyenne, 4.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF THE MONTH.

[Expressed in inches and tenths.]

Colorado.—Pike's Peak, 14.

New Hampshire.—Mount Washington, 12.1.

New Mexico.—Santa Fé, none in valleys, 25 on mountains.

SLEET.

Arizona.—Prescott, 28th.

California.—Sacramento, 18th.

Colorado.—Pike's Peak, 1st, 2d, 3d, 8th, 14th, 15th, 19th to 23d, 28th, 29th, 30th.

Idaho.—Boisé City, 17th, 18th.

Illinois.—Chicago, 11th.

Indiana.—La Fayette and Indianapolis, 14th.

Iowa.—Dubuque, 7th; Cresco, 12th, 17th.

Kentucky.—Louisville, 14th.

Maryland.—Baltimore, 4th.

Michigan.—Mackinaw City, Ann Arbor, and Northport, 2d; Hudson, 1st.

Minnesota.—Saint Vincent, 3d.

Montana.—Fort Benton, 22d; Fort Maginnis, 10th, 14th.

New Hampshire.—Mount Washington, 6th.

New York.—Palermo, Humphrey, Buffalo, and Oswego, 3d; Ithaca, 4th; Mountainville, 2d; Albany, 4th, 12th.

Ohio.—Toledo, Sandusky, Garrettsville, and North Lewisburg, 3d; Tiffin, 2d; Cleveland, 23d.

Oregon.—Lakeview, 13th.

Pennsylvania.—Erie, 3d; Leetsdale, 12th; Wellsboro, 1st; Mahanoy Plane, 3d, 4th.

Vermont.—Burlington, 3d.

Virginia.—Bird's Nest, 1st; Cape Henry, 10th.

Wisconsin.—Wausau, 1st; Milwaukee and La Crosse, 14th, 17th.

HAIL.

Corsicana, Texas: a violent wind and hail-storm swept over this place on the evening of the 2d. Hail-stones of unusual size fell, breaking sky-lights and windows. Stock in the surrounding country suffered severely, many animals being killed.

Leavenworth, Kansas: a thunder-storm prevailed from 3.15 to 4 a. m., on the 2d; from 4 to 4.08 a heavy fall of hail occurred. On the 30th a very heavy fall of hail began at 12.30 a. m. and continued for a few minutes; in some parts of the city the hail stones fell to a depth of five inches. The storm approached suddenly from the northwest and the fall of hail was followed by very heavy rain which continued until 2.15 a. m.

Thorpe's Spring, Hood county, Texas: a severe rain and hail-storm occurred at this place during the night of the 15-16th. The fall of rain and hail began at 11.15 p. m. and continued with great violence for twenty minutes. The storm came from the southwest; it was accompanied by continuous flashes of lightning and very loud thunder, which caused substantial buildings to shake.

Talladega, Talladega county, Alabama: a severe hail-storm occurred about four miles south of this place on the 17th. Hail fell for about twenty minutes, covering the ground in some places to unusual depths. The young corn was ruined and trees were stripped of their foliage.

Much damage was done at Mardisville, a village five miles southeast of Talladega.

The April report of the "Alabama Weather Service," under direction of Professor P. H. Mell, jr., contains the following account of a hail-storm which occurred at Roanoke, Randolph county, Alabama, on the 17th.

The storm occurred about 1.30 p. m., and was about three miles wide. The fall of rain was almost like a flood, with a strong wind, blowing down some fences and prostrating many forest trees. The storm came from the northwest, and it is thought that about three inches of hail fell, although the stones were not unusually large. The trees were stripped of their foliage and the fruit crop was nearly destroyed along the track of the storm. The glass in many windows was broken. At Ashland and Fredonia the storm was equally severe. Light hail fell in various parts of the county.

San Antonio, Texas: a violent hail-storm is reported to have occurred on the 18th at Pearsall, Trio county, about twenty-five miles southwest of this place. The hail-stones were about the size of marbles and covered the ground to a depth of several inches. A frame church was completely demolished, together with some smaller buildings. Gardens and crops were badly damaged.

Louisville, Kentucky: from 6.03 to 8.13 p. m. on the 17th, a thunder-storm occurred accompanied by hail of small size. Trees and shrubbery were stripped of young buds and sky-lights and windows were broken.

Clay Centre, Clay county, Kansas: at 5.25 a. m., on the 29th, a thunder-shower, accompanied by a light fall of small hail, occurred at this place.

Reports from Wakefield, in the southeastern part of Clay county, Kansas, state that during the night of the 28-29th a very violent hail-storm occurred there. The storm came from the southwest and caused great damage in the vicinity of Wakefield. Some of the hail stones were five inches in circumference; trees were stripped of their foliage and small animals killed.

Hail is also reported to have fallen in the following states and territories:

Alabama.—Mount Vernon Barracks, 8th.

Arkansas.—Lead Hill, 15th.

Arizona.—Prescott and Wickenburg, 15th.

California.—Fort Bidwell, 13th, 16th; Sacramento, 7th; Oakland, 19th; Blue Lake, 9th, 16th, 18th; Tower House, 16th; Hydesville, 18th; College City, 26th; Cahuenga Valley, 27th.

Colorado.—Pueblo, 4th, 28th; Denver, 2d, 15th; Montrose, 4th, 6th, 14th, 15th, 21st, 22d.

Connecticut.—North Colebrook, 26th; Hartford, 2d, 29th.

Dakota.—Fort Pembina, 3d; Fort Totten, 10th, 11th; Fort Sisseton, 10th.

District of Columbia.—West Washington, 8th.

Georgia.—Quitman, 17th, five miles northeast of station.

Illinois.—Edgington, 16th; Bunker Hill, 30th; South Evans-ton, 11th, Mattoon, Swanwick, Wilton Centre and Charleston, 7th.

Indiana.—Laconia, Vevay, and Jeffersonville, 17th; Logans-port, 3d, 11th, 25th; Terre Haute, 12th; Indianapolis, 12th, 17th.

Iowa.—Keokuk, 28th; Oskaloosa, 4th; Ottumwa, 16th.

Kansas.—Manhattan, 7th, 30th; Independence and Wellington, 14th; Wyandotte, 29th; Salina, 21st, 29th; Allison, 15th; Leavenworth, 1st; West Leavenworth, 30th; Maud, 1st, 13th, 14th; Sterling, 20th, 27th; Oswego, 26th.

Kentucky.—Frankfort, 8th, 17th; Richmond, 8th.

Louisiana.—Point Pleasant, 2d, 7th.

Maine.—Gardiner, 4th; Waterville and Portland, 29th.

Massachusetts.—Taunton, 2d, 13th; Worcester, Rowe and Boston, 26th.

Michigan.—Hudson, 3d; Boyne and Escanaba, 2d; Mottville, 11th; Moorestown, 21st.

Minnesota.—Saint Vincent, 24th.

Missouri.—Independence, 1st, 29th; Pierce City and Carthage, 15th; Conception, 20th; Saint Louis, 16th.

Nebraska.—De Soto and North Platte, 20th; Red Willow, 19th, 20th, 28th, 29th; Stockham, 27th; Omaha, 20th, 27th.

Nevada.—Fort McDermitt, 13th, 28th.

New Jersey.—Dover, 29th.

New Mexico.—Fort Union, 28th.

New York.—Plattsburg Barracks, 26th; Madison Barracks, Fort Columbus and Mountainville, 2d; Humphrey, 3d, 28th; Albany, 12th, 26th.

North Carolina.—Raleigh, 10th; Blackwell, 9th; Wash Woods, 14th.

Ohio.—College Hill, 12th, 14th; Jacksonborough, 3d, 12th; Garrettsville, 28th; Yellow Springs, 17th; Cincinnati, 14th, 17th; Columbus, 12th, 17th.

Oregon.—Fort Klamath, 2d, 13th, 18th; Albany, 15th, 16th, 17th; East Portland, 12th, 14th, 15th, 16th; Portland, 12th, 14th, 15th, 16th; Roseburg, 16th, 17th.

Pennsylvania.—Blooming Grove, 28th; Dyberry, 4th, 28th.

Tennessee.—Austin, 9th.

Texas.—Cleburne, 11th, 24th; New Ulm and Austin, 2d; Comfort, 7th, 17th; Fort Concho, 5th, 11th, 17th; Fort Davis, 5th.

Utah.—Nephi, 8th, 22d.

Virginia.—Bird's Nest, 10th; Dale Enterprise, 18th.

Washington Territory.—Tacoma and Pysht, 15th; Fort Canby, 14th, 16th, 17th; Fort Townsend, 15th.

Wisconsin.—Sussex, 1st; Manitowoc, 2d; Embarras, 14th, 27th.

Wyoming.—Fort Fred Steele, 14th; Fort Bridger, 19th, 21st, 22d, 27th.

PRECIPITATION FROM A CLOUDLESS SKY.

Lead Hill, Arkansas: at about 8 p. m. of the 10th a sprinkle of rain fell, lasting two minutes. The sky was clear, except a small cloud in the southwest, and the stars were plainly visible at the time.

Mount Washington, New Hampshire: from 12.25 to 12.35 p. m., on the 12th, very light snow fell when the sky was entirely cloudless.

WINDS.

The most frequent directions of the wind during April, 1885,

are shown on chart ii. by arrows flying with the wind. In the west Gulf states, southern slope, lower Missouri, upper Mississippi, and Ohio valleys, and Tennessee the prevailing directions were mostly from the south; they were variable in all other districts.

HIGH WINDS.

(In miles per hour.)

During the month of April, velocities of fifty or more miles per hour were recorded at stations as follows:

On the summit of Mount Washington, New Hampshire, 84, w. 1st; 90, sw. 2d; 82, sw. 3d; 54, se. 4th; 70, nw. 5th; 60, nw. 6th; 60, sw. 7th; 75, w. 8th; 75, nw. 9th; 50, w. 10th; 62, nw. 15th; 67, nw. 16th; 50, w. 19th; 76, sw. 20th; 86, nw. 21st; 60, nw. 22d; 80, nw. 24th; 70, nw. 25th; 70, se. 26th; 96, nw. 27th; 61, nw. 28th; 79, nw. 30th.

Pike's Peak, Colorado, 80, w. 8th; 62, n. 9th; 57, w. 18th; 78, w. 26th.

Fort Buford, Dakota, 50, w. 6th.

Fort Totten, Dakota, 54, nw. 7th.

Fort Sill, Indian Territory, 80, sw. 21st.

Dodge City, Kansas, 63, se. 20th; 58, se. 21st.

Boston, Massachusetts, 60, n. 29th.

Fort Maginnis, Montana, 52, n. 6th.

Sandy Hook, New Jersey, 64, nw. 29th.

Cape May, New Jersey, 56, nw. 14th; 70, nw. 29th.

Indianola, Texas, 56, e. 23d.

Fort Elliott, Texas, 51, s. 21st.

Cape Henry, Virginia, 56, nw. 29th.

Chincoteague, Virginia, 50, nw. 29th.

Fort Myer, Virginia, 50, nw. 29th.

Tatoosh Island, Washington Territory, 56, w. 14th.

LOCAL STORMS AND TORNADOES.

Waverly, La Fayette county, Missouri: a tornado occurred at this place at 8.30 p. m., on the 1st. Its course was to the northeastward, its path being about one hundred feet wide. One church and four dwellings were destroyed. The damage to property is estimated at \$60,000. No persons were killed.

Martin, Falls county, Texas: a tornado occurred at this place at about 4 p. m. on the 2d. Two churches and several stores were demolished, the court-house partially destroyed, and a number of persons injured.

Point Pleasant, Tensas parish, Louisiana: a thunderstorm prevailed between 2 p. m. and midnight of the 2d, the electrical display being constant and vivid; rain began to fall at 3.15 p. m., and continued until midnight, 6.02 inches falling during that time. Another heavy rain and thunder-storm began at 11.50 p. m. on the 5th, and continued until 6.58 a. m. on the 7th, the precipitation amounting to 12.28 inches.

Natchez, Mississippi: violent thunder-storms with very heavy rain occurred between 2 p. m. on the 6th and 4 a. m. on the 7th, the rainfall amounting to 5.31 inches, which is considered the heaviest that has occurred for many years; much damage was done.

Whitney, Hill county, Texas: a tornado occurred at this place at 7.30 p. m. on the 11th. The direction of movement was east, 10° north. Much damage was done to buildings. Two persons were injured.

Gainesville, Cooke county, Texas, 18th: reports from the southeastern part of this county state that a destructive storm occurred in that locality during the night of the 15-16th. At Burns four dwellings were totally wrecked and other damage caused.

The Charlotte, N. C., "Observer" of the 18th states that a tornado occurred at Laurinburg, Richmond county, at about 5 p. m. on the 16th. It was preceded by a violent hail-storm lasting ten minutes, the hail-stones accumulating to a depth of ten inches in fence corners and near buildings. The tornado was not more than two minutes in passing through the town and was preceded and accompanied by a roaring sound. Two stores and a hotel were unroofed, while a number of smaller buildings and many trees were blown down.

Considerable damage was also done in the county to barns, fencing, etc.

Mr. M. D. L. Jordan, voluntary observer at Milan, Gibson county, Tennessee, reports that a tornado occurred six miles west of that place during the evening of the 17th; the tornado's path was about one hundred yards wide; much damage was done to out-buildings, fencing and timber.

Nashville, Tennessee: a tornado occurred at Brentwood, Williamson county, during the evening of the 17th. Two buildings, one a church, were blown down and a large stable was lifted from its foundation; a large pile of railroad ties was blown over.

Yuma, Arizona, 19th: a high northwesterly wind set in at 6.30 p. m. and increased in force during the night. The air was filled with clouds of sand, which enveloped the town and rendered it impossible to distinguish objects at more than a few paces distant. At 10.50 p. m. a large tree within a few yards of the office building was blown down, breaking the wires of the anemometer. A number of other trees and fences in the vicinity of the station were also blown down and small boats on the river were capsized. The maximum velocity of the wind was 48 miles per hour. The storm continued until after midnight and then abated.

Crawford, McLennan county, Texas: at 12.20 p. m. on the 19th a funnel-shaped tornado-cloud was observed approaching this place from the southwest; it passed through the northwestern part of the town in a curved path; houses were overturned and fences blown down; the tornado was of but a few minutes duration.

Waco, McLennan county, Texas: a tornado occurred six miles north of this place at 1 p. m. on the 19th. The tornado-cloud was funnel-shaped and moved in a northeasterly direction, its path being twenty-five miles long and three hundred feet wide. The cloud whirled in a direction contrary to the movement of the hands of a watch. A thunder-storm preceded the tornado and heavy rain fell both before and after the storm. No persons were killed, but fences, trees, and houses were blown down.

The observer at Fort Supply, Indian Territory, reports that at 9.10 p. m. (75th meridian time) on the 20th, a tornado occurred at that place. The tornado-cloud was first noticed in the southwest; it moved first to the northeast and afterward changed its course to north and northwest, and is reported to have ascended from the earth when it reached the hills, about two miles north of station, where it was last seen. The course of the storm was over a space almost unoccupied, which accounts for the small amount of damage done. The Indian teepees, about one thousand yards east of the signal office, were destroyed. The Indians report that the teepees were first twisted around from right to left and then carried away. An out-house, about fifty yards from the teepees, was carried a distance of thirty yards, and a large telegraph pole was blown down and carried a distance of seventy-five yards.

The conditions preceding the tornado were as follows: an overcast sky during the morning, the clouds moving slowly from the south; fresh to brisk southerly winds until 5.50 p. m., then calm and sultry; rain and hail at intervals from 6.23 to 7.30 p. m., with thunder and lightning at 7.25 p. m.; calm and sultry at 9 p. m.; from 6.25 to 7.25 the temperature fell from 73° to 64°. The tornado was followed by heavy rain-showers, hail, thunder, and lightning. At 11.05 p. m. the wind shifted to southeast and blew at a velocity estimated at sixty miles, and heavy, dark clouds were observed in the west, northwest, east, and southeast, moving slowly northward; at 11.25 the wind moderated and was followed by heavy showers, with thunder, lightning and hail.

Daylight on the morning of the 21st showed a well-defined path of a tornado which occurred during the night, concerning which the following statement was made by a sentinel, Private John Conn, company G., 24th U. S. Infantry, at this post: "I was walking post No. 2, which extends about two hundred yards north and south in rear of officers' quarters, on

east side of garrison. At about 12.55 a. m. the wind, which had been blowing strongly from southeast, abated, and a calm prevailed for about one minute. I then noticed a large black, funnel-shaped cloud, slightly west of south from where I stood. The upper and larger part was inclined to the north, the lower portion apparently dragging along behind. It appeared to be about a mile distant from me. It had great attractive power for other clouds close to it, as it drew them rapidly into itself. The cloud had a violent whirling motion from right to left. The wind struck and carried me five or eight feet and dropped me into a pool of water. From the time I first noticed the cloud until I was knocked down, about five or eight minutes had elapsed. I saw nothing of the cloud after it passed me, as I was frightened too much to look up. This cloud came from the east side of the garrison, or towards me from the south-southwest."

The storm was particularly severe and destructive at the southeast end of the garrison, and, while the buildings on the northeast, east, and west sides of the parade ground were mostly unharmed, many out-houses on the north side of the garrison were blown down. The damage caused by the tornado at this post is estimated at about \$3,000.

Fort Sill, Indian Territory: high southerly winds prevailed on the 20th. At 11 p. m. a violent storm occurred, which continued until the morning of the 21st. The maximum wind velocity, sixty-five miles per hour, occurred at 3.30 a. m., and for a short time the wind blew at the rate of eighty-four miles per hour. The roofs of several of the most important buildings at this post were blown off, while many small houses were blown down. The storm, when at its height, was accompanied by very heavy rain, thunder, and lightning.

Dodge City, Kansas, 20th: high southeasterly winds prevailed during the day with rain from 5.40 to 6.40 p. m. and from 8 p. m. until 1.30 a. m. on the 21st; at 4 p. m. a thunder storm passed over the station from southwest to northeast; at 7.15 p. m. the wind, for five minutes, blew at the rate of seventy-eight miles per hour from the southeast. But little damage resulted in this vicinity; several small houses on the prairie were blown down. From 11 a. m. on the 18th to 7 a. m. on the 21st, the wind blew steadily from the southeast.

Oberlin, Decatur county, Kansas: the wind blew from the south with considerable force nearly all day on the 20th, and at about 6 p. m. a threatening bank of clouds appeared in the southwest over which vivid flashes of lightning played continuously. At 7 p. m. rain and hail began to fall which soon ended; this was shortly followed by three sudden gusts of wind occurring in quick succession. At 7.30 p. m., many persons living west of the town observed a tornado-cloud passing down the valley of the north fork of the Sappa river, the cloud being high in the air, but was particularly noticeable on account of its rotary motion and inky blackness. The roaring and rumbling sound was plainly heard for a distance of two miles preceding its approach. The cloud passed down the valley for a distance of four miles before it descended to the ground; it soon ascended into the air again, but struck the ground a second time near the outskirts of the town, through which it passed, destroying or damaging about a dozen buildings. The tornado pursued a zigzag course from southwest to northeast, and its path was about seventy-five feet in width. No damage has been reported as having been caused by the tornado after leaving Oberlin. Reports from Hooker, about six miles southeast of Oberlin, state that one dwelling was destroyed and another unroofed at that place.

Ellsworth, Ellsworth county, Kansas: the heaviest rain and wind storm experienced for many years occurred during the night of the 20-21st.

Denison, Grayson county, Texas: a tornado occurred at this place at 5.35 p. m. on the 21st, moving in a northeasterly direction. After the storm a heavy rain fell, which continued for twenty-four hours. One person was killed and much damage was done to buildings. The total valuation of property destroyed is estimated at \$20,000.

Sterling, Rice county, Kansas: a tornado occurred at this place at 2 a. m. of the 21st, moving in a northeasterly direction; width of path three hundred and fifty feet. Some hail and also a very heavy rain accompanied the storm. The sugar works were demolished and several houses and barns destroyed.

Peoria, Hill county, Texas: a tornado occurred at this place at 10 a. m. on the 22d. It moved in a northeasterly direction, its path being four miles in length and four hundred feet in width. One person was killed and three were wounded. Much stock was killed, and two dwellings, a school-house, and many outbuildings were destroyed. The damage done to property is estimated at \$10,000.

Prairie Grove, Limestone county, Texas: a tornado occurred at this place at 1 p. m. on the 22d. It moved in a northeasterly direction and the width of the destructive path was 2,500 feet. The tornado-cloud was funnel-shaped. A very heavy rain fell during and after the storm. One person was killed, eighteen were injured, and five houses, one mill and one store were blown down.

Dallas, Texas: at 3 a. m. on the 22d, a very severe storm occurred at this place, causing considerable damage to buildings, many of which were unroofed; fences were also blown down and the fruit crop was badly damaged.

Reading, Pennsylvania: a violent wind-storm prevailed in this (Berks), and the adjoining counties during the early morning of the 29th; many trees were blown down. The change in temperature during the storm was very unusual, the thermometer falling from 25° to 30° in a short time. At Lenharts-ville, Berks county, a number of buildings were unroofed.

Canajoharie, Montgomery county, New York: during the morning of the 29th, a whirlwind destroyed about thirty trees at Argusville, a few miles south of this place.

Harrisonville, Cass county, Missouri: a tornado occurred five miles north of this place at 8.30 p. m. on the 29th. It moved in an east-northeasterly direction and occupied but an instant in passing a given point. During the progress of the tornado one person was struck by lightning at Olathe, Kansas, and one killed at Kingsville, Missouri. Seven houses, two stores, and many outbuildings were destroyed. Near Pleasant Hill, Missouri, fourteen freight cars were thrown from the track.

NAVIGATION.

ICE IN RIVERS AND HARBORS.

Black river.—Port Huron, Michigan: the ice began to break on the 7th; during the night of the 7-8th the river rose rapidly, and on the following day 100,000 logs floated down the river, forming a jam at the bridge; the river began to fall at about noon, but rose again during the night of the 8-9th; at 3.30 p. m. on the 9th a large raft broke away, carrying with it a steam barge and two schooners; one of the schooners was sunk, and the bridge was damaged to the extent of \$6,000; the river began to fall during the evening of the 9th.

Chaumont bay.—Madison Barracks, New York: the ice broke up on the 24th.

Delaware river.—Easton, Pennsylvania: the ice dam at Delaware Water-Gap broke during the night of the 2-3d; on the 3d the river at Easton was filled with heavy ice.

Detroit river.—Detroit, Michigan: floating ice from 1st to 6th, and from 18th to 22d.

Devil's lake.—Fort Totten, Dakota: crossing on the lake was discontinued on the 16th, there being large openings in the ice; the ice began to break near the station on the 29th.

Des Moines river.—Des Moines, Iowa: river free from ice on 2d.

Duluth bay.—Duluth, Minnesota: the ice began to break on the 4th; by the 15th ice had disappeared from around the docks.

Escanaba river.—Escanaba, Michigan: the ice began to break on the 21st.

Grand river.—Grand Haven, Michigan: the river opened during the night of the 4-5th; heavy floating ice continued

until the 9th. The steamer "Barret" arrived from Grand Rapids on the 15th.

Ionia, Michigan: ice went out of river on the 3d.

Grand Traverse bay.—Northport, Michigan: ice in harbor began to move on the 26th; on the 29th the bay was free from ice.

Traverse City, Michigan: the ice went out of the west arm of the bay on the 29th.

Hudson river.—Albany, New York: ice began to move on the 3d, and during the night went out, leaving the river clear. During the morning of the 4th the ice from the Mohawk river came down and formed an ice dam at Van Wie's Point, causing the water to rise rapidly and to submerge the docks on Quay street. The ice-dam gave way on the 6th, leaving the river open for navigation from Troy to New York City. Floating ice continued from the 5th to 8th. The first steamer of the season arrived on the 9th.

Kennebec river.—Richmond, Maine: on the 10th the ice between this place and South Gardiner was broken and running with the tide.

Waterville, Kennebec county, Maine: the ice went out of the river at this point on the 17th.

Lake Champlain.—Burlington, Vermont: the ice passed out of the lake during the night of the 24th; navigation was resumed on the 25th.

Lake Erie.—Buffalo, New York: the harbor was filled with ice on the 26th.

Toledo, Ohio: the steam barge "Mills" left port for Detroit on the 13th, being the first departure of the season; the schooner "J. R. Pelton" from Cleveland on the 22d, was the first arrival.

Cleveland, Ohio: navigation for the season was resumed on the 17th.

Lake Huron.—Port Huron, Michigan: the steamer "Idlewild" arrived from Detroit on the 23d, being the first arrival of the season, and the steam barge "City of Concord," departed for the upper lake ports on the same date.

Lake Michigan.—Alpena, Michigan: navigation was resumed on the 26th; the first steamer of the season arrived on that date.

Grand Haven, Michigan: the propeller "Wisconsin" arrived on the 2d, after having been ice-bound in mid-lake since March 16th; the tug "Aretic," which was also ice-bound for several weeks, arrived on the 3d; the harbor was blockaded with ice on the 8th; the propeller "Oneida," which left Milwaukee for this port on the 7th, arrived on the 12th, having encountered ice-fields, which delayed her for several days; the harbor was filled with heavy ice on the 22d, when no open water could be seen from this port; the heavy drift-ice in the harbor continued on the 23d.

Manistiquie, Schoolcraft county, Michigan: the harbor was clear of ice on the 19th; lake opened on the 23d; first boat (from Chicago) of season arrived on the 27th.

Milwaukee, Wisconsin: at the close of the month there were still large ice fields in the lake, but steam vessels were able to ply between ports on the eastern and western shores without experiencing much difficulty.

Lake Ontario.—Rochester, New York: there were large fields of ice in the lake on the 6th.

Oswego, New York: the high winds on the 26th drove the ice out of the harbor into the lake; on the 27th the harbor was again closed.

Lake Superior.—Duluth, Minnesota: on the 15th the ice was solid as far as could be seen from this station; the ice near Minnesota Point was broken by the southwesterly winds on the morning of the 22d; on the 27th the propeller "R. G. Stewart," with passengers and freight, made a trip to Agate bay; on the 29th the propeller "Isle Royal" left for the north shore, the lake being entirely free from ice.

Lake Whitney.—New Haven, Connecticut: the ice broke up on the 4th; in 1884 it broke up on March 25th; in 1883, on April 5th; and in 1882, on March 3d. During the winter of

1884-'85 the ice on the lake was sufficient to bear the weight of pedestrians for one hundred and five days; during the winter of 1883-'84 the lake was frozen one hundred days.

Little bay De Noquet.—Escanaba, Michigan: the ice began to break near Ford river on the 27th; the high southerly winds on the 29th broke up the ice in the bay.

Manistique river.—Manistique, Schoolcraft county, Michigan: river opened on the 17th.

Maumee bay and river.—Toledo, Ohio: the ice broke up on the 1st and 2d; the river was filled with floating ice on the 3d, 4th, and 5th; on the 6th the river was nearly free from ice, but the ice in the bay remained solid, closing the harbor.

Mississippi river.—Saint Paul, Minnesota: on the 5th the river to the southward was clear of ice as far as could be seen; the first steamer of the season arrived on the 21st.

La Crosse, Wisconsin: river clear of ice on the 1st; first steamer arrived on the 10th.

Dubuque, Iowa: floating ice on the 2d and 3d; river free from ice on the 4th; first steamer arrived on the 5th.

Missouri river.—Fort Buford, Dakota: ice broke up on the 2d; floating ice continued on the 3d and 4th; the first north-bound steamer of the season arrived on the 28th.

Bismarck, Dakota: ice began to break on the 5th.

Fort Yates, Dakota: the river was filled with floating ice on the 7th and 8th.

Fort Bennett, Dakota: heavy drift ice on the 8th and 9th; the first steamer of the season passed the station on the 18th.

Niagara river.—Buffalo, New York: floating ice on the 2d, 4th and 26th.

North Branch—Susquehanna river.—Williamsport, Pennsylvania: on the 2d the river was clear of ice from Northumberland to Farrisville, a few miles above Lock Haven, but an ice-dam extended from near Farrisville up the river for a distance of fifteen miles.

Oswego river.—Oswego, New York: the ice in the lower part of the river began to break up on the 5th; on the 12th, the ice went out without causing damage.

Otsego lake.—Cooperstown, Otsego county, New York: the lake opened on the 26th, being nine days later than the average date of opening.

Penobscot river.—Bangor, Maine: the ice began to break up on the 17th; on the 18th, the ice left the river, and the first boat of the season arrived.

Red river of the north.—Saint Vincent, Minnesota: the ice began to break up on the 14th; an ice dam formed on the 16th; river free from ice on the 20th; the first steamer of the season arrived on the 27th.

Sandusky bay.—Sandusky, Ohio: the bay was clear of ice on the 7th.

Susquehanna river.—Wilkesbarre, Pennsylvania: the ice-dam between this place and Nanticoke broke on the 2d. On this date the river was reported clear of ice from Pittston to Tunkhannock, a distance of about eighteen miles.

Havre de Grace, Maryland: on the 2d, there was but little ice between this place and the mouth of the river.

Strait of Mackinac.—Mackinaw City, Michigan: the steamer "Algoma" arrived on the 17th, having been eight days in forcing passage through heavy ice from Saint Ignace, a distance of seven miles. Vehicles continued to cross the strait until the 17th; strait clear of ice on the 29th.

Miscellaneous.—Dover, Morris county, New Jersey: navigation on Morris canal was resumed on the 12th.

Bangor, Maine: the ice in Kenduskeag creek began to break up on the 8th; the creek was free from ice on the 12th.

Madison, Wisconsin: the ice in Monona lake broke up on the 28th, and in Mendota lake on the 20th.

The following extract is from the New York "Journal of Commerce" of April 27, 1885:

The Toronto bay was clear of ice on Saturday, it having been closed for the longest time this year that is on record since 1823, with the exception of 1836, when the ice broke up one day later than this year.

STAGE OF WATER IN RIVERS.

In the table below are shown the danger points in the rivers at the various stations, the highest and lowest stages for April, 1885, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, April, 1885.

[Expressed in feet and tenths]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, Louisiana.....	29 9	24	22 0	1, 2	18 4	3 6
<i>Arkansas:</i>						
Fort Smith, Arkansas.....	15 0	25	28 1	2, 18	6 2	21 9
Little Rock, Arkansas.....	23 0	27	25 8	21	7 6	18 2
<i>Missouri:</i>						
Yankton, Dakota.....	24 0	12	10 3	15, 19	8 5	1 8
Omaha, Nebraska.....	18 0	14	10 7	22, 23	8 2	2 5
Leavenworth, Kansas.....	20 0	15	12 4	23	9 5	2 9
<i>Mississippi:</i>						
Saint Paul, Minnesota.....	14 5	28, 29	7 3	19	4 0	3 3
La Crosse, Wisconsin.....	24 0	30	9 4	1	6 3	3 6
Dubuque, Iowa.....	16 0	19, 20	10 4	1	6 7	3 7
Davenport, Iowa.....	15 0	21, 24	9 2	1, 3	5 9	3 3
Keokuk, Iowa.....	14 0	25, 26	11 2	1	6 6	4 6
Saint Louis, Missouri.....	32 0	29	25 9	2	16 7	9 2
Cairo, Illinois.....	40 0	26	38 2	3	21 3	16 9
Memphis, Tennessee.....	34 0	30	28 0	5, 6	15 4	12 6
Vicksburg, Mississippi.....	41 0					
New Orleans, Louisiana.....	—3 0	5	—3 3	13, 14	—4 8	1 5
<i>Ohio:</i>						
Pittsburg, Pennsylvania.....	22 0	4	16 2	30	6 4	9 8
Cincinnati, Ohio.....	50 0	21	37 1	1	9 8	27 3
Louisville, Kentucky.....	25 0	22	13 9	2	5 8	8 8
<i>Cumberland:</i>						
Nashville, Tennessee.....	40 0	22	19 6	16	7 0	12 6
<i>Tennessee:</i>						
Knoxville, Tennessee.....						
Chattanooga, Tennessee.....	33 0	21	15 5	17	4 1	11 4
<i>Monongahela:</i>						
Pittsburg, Pennsylvania.....	29 0	4	16 2	30	6 4	9 8
<i>Savannah:</i>						
Augusta, Georgia.....	32 0	1	9 6	24 to 27	6 7	2 9
<i>Mobile:</i>						
Mobile, Alabama.....			19 4		16 5	2 9
<i>Sacramento:</i>						
Red Bluff, California.....		3	2 0	24 to 30	1 3	0 7
Sacramento, California.....		13	15 2	30	13 5	1 7
<i>Willamette:</i>						
Portland, Oregon.....		17, 18	8 6	25	6 2	2 4
<i>Colorado:</i>						
Yuma, Arizona.....		28	19 5	12, 13	16 6	2 9

* Below high-water mark of 1874 and 1883. † No record on 1st, 2d, and 3d.

The Arkansas river at Fort Smith, Arkansas, was 28.1 feet when at its highest stage on the 25th, the danger line at that place being fifteen feet. At Little Rock the highest stage (2.8 feet above the danger line) was recorded on the 27th. The other rivers have remained below the danger line, and no sudden or dangerous rises have occurred.

FLOODS.

Saint Louis, Missouri, 3d: the heavy rains which fell in the western part of the state on the 1st caused all streams to rise rapidly, carrying away bridges and causing other damage.

Port Gibson, Claiborne county, Mississippi: the heavy rains of the 6th and 7th caused Bayou Pierre and other streams in this vicinity to overflow, resulting in damage to bridges, fencing, and crops, estimated at \$20,000.

Port Huron, Michigan: Black river reached a dangerous height on the 9th and 10th, causing damage estimated at \$20,000. A new iron bridge was destroyed on the 9th.

Carlinsville, Macoupin county, Illinois: a very heavy fall of rain occurred during the night of the 16-17th, causing all streams in this vicinity to overflow; much damage was done to bridges and culverts.

Hannibal, Marion county, Missouri: the heavy rains during the night of the 16-17th caused several land-slides on the Saint Louis, Keokuk, and Northwestern railroad, near this place.

Vevay, Switzerland county, Indiana: the heavy rains of the 16th and 17th caused destructive freshets in the streams in this vicinity. A saw mill at the junction of Indian and Bushy creeks was washed away.

Kingman, Kingman county, Kansas: a destructive flood occurred in the south fork of the Ne Ne Squaw river at this place on the morning of the 21st, which is supposed to have been due to a "cloud burst." Heavy rains fell during the night of the

20-21st; about 9 a. m. the river began to rise with great rapidity and in thirty minutes it had risen five feet; it continued to rise and soon flooded the town. Fifteen dwellings were washed away and a number of persons drowned. At 3 p. m. the water began to recede.

Reports from Medicine Lodge, Barbour county, Kansas, about thirty-five miles southwest from Kingman, state that during the early morning of the 21st the water came down suddenly over the low lands east of that place, flooding them to the depth of from five to twelve feet. Medicine Lodge is situated at the junction of Medicine Lodge and Elk creeks. In the Elk creek bottoms, east of the town, about a dozen houses were entirely destroyed and many of their occupants drowned, while many others were only saved by being rescued from the branches of trees. North of Medicine Lodge whole families were drowned. A large number of cattle were also drowned and extensive fields of crops were ruined.

Breckenridge, Stephens county, Texas: the heavy rains of the 21st and 22d caused all streams in this section to rise to unusual heights; a large number of hogs and cattle were drowned.

Abilene, Taylor county, Texas: the heavy rains on the 20th and 21st, in the western part of the state, caused the streams to overflow, and in many cases caused interruption to travel. A serious washout occurred on the Texas Pacific railroad between this place and Fort Worth.

Gainesville, Cook county, Texas: a destructive flood occurred at this place on the 20th. Very heavy rain fell during the night of the 19-20th, causing Pecan creek, which runs through the eastern part of the town, to rise rapidly. At 3 a. m. many houses were flooded and some were washed away; many persons narrowly escaped drowning. The flood is considered the most destructive that has ever occurred here; the water rose to a height two feet higher than it was twenty-seven years ago, when great loss of life and property occurred.

Saint Louis, Missouri, 23d: reports from southeastern Kansas state that the heaviest rains ever experienced in that section occurred on the 21st; more than twelve inches of rain is reported to have fallen. Traffic on the Missouri, Kansas and Texas railroad for many miles both to the north and south of Parsons was suspended, and a large number of hogs and cattle were drowned near Parsons. The Marmaton river overflowed and inundated a settlement of from six to eight hundred inhabitants, known as North Fort Scott, the water being from three to five feet deep in the houses. The Missouri Pacific railroad was badly washed near Fort Scott, causing suspension of travel.

Fort Scott, Bourbon county, Kansas, 23d: the damage to property in this town and vicinity is estimated at from \$5,000 to \$8,000.

Austin, Texas: a destructive flood occurred on the 23d and began to subside on the 24th. On all railroads running to this place extensive wash-outs occurred and many bridges were washed away. The Missouri Pacific and International Great Northern railroad companies sustained heavy losses. All streams in the vicinity of Austin were much swollen and many houses along their banks were carried away. In Austin the water rushed through the streets and many stores were flooded. The Colorado river rose eighteen feet in three hours, submerging the neighboring lowlands.

Fort Smith, Arkansas: more than four inches of rain fell at this place on the 22d. At about 2 p. m. the river began to rise rapidly and by 9 p. m. it had risen 10.4 feet; it continued to rise on the 23d, and at 2 p. m. the river gauge read 27.3 feet, or a rise of 17.3 feet in twenty-four hours; the lowlands in this vicinity were submerged, causing but little damage. The river fell slowly on the 24th, but rose again on the 25th, reaching a height of 28.1 feet during the night; it began to fall on the 26th.

Little Rock, Arkansas: the river rose at the rate of half a foot per hour on the 24th and reached the danger line about noon; it continued to rise on the 25th and 26th with much

floating debris; at noon of the 27th it became stationary, having reached a point two feet and eight-tenths above the danger line; on the 28th it began to fall slowly.

Reports from Montreal, Quebec, on the 23d, stated that the Saint Lawrence river had risen one foot and three inches during the preceding twenty-four hours and that the basements of many buildings on the lower streets were flooded. A large part of the village of La Prairie was inundated. The village of Saint Gabriel, near Quebec, was submerged in many places to depths of from six to eight feet. On the 29th it was reported that the damage caused by the freshet at Montreal was estimated at \$100,000.

Fort Edward, New York, 24th: about thirty feet of the dam across the Hudson river at this place has been carried away; the water reached the highest point that has been known here for fifteen years.

Saint John, New Brunswick, 27th: a destructive freshet has occurred in the Saint John river; many bridges have been washed away and extensive washouts have occurred along the railroad from Woodstock to Presque Isle.

HIGH TIDES.

Indianola, Texas, 13th, 21st, 22d, 24th.
New London, Connecticut, 26th.

LOW TIDES.

New River Inlet, North Carolina, 20th, 21st, 23d.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for April, 1885, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.26 per cent. The percentages for the four elements are: Weather, 87.42; direction of the wind, 79.07; temperature, 79.83; barometer, 88.46 per cent. By geographical districts, they are: For New England, 81.16; middle Atlantic states, 85.57; south Atlantic states, 83.13; eastern Gulf states, 83.56; western Gulf states, 84.71; lower lake region, 80.96; upper lake region, 80.98; Ohio valley and Tennessee, 85.96; upper Mississippi valley, 85.04; Missouri valley, 82.09; north Pacific coast region, 84.20; middle Pacific coast region, 78.16; south Pacific coast region, 86.60. There were forty-six omissions to predict out of 3,753, or 1.22 per cent. Of the 3,707 predictions that have been made, eighty-five, or 2.29 per cent., are considered to have entirely failed; one hundred and thirty-nine, or 3.75 per cent., were one-fourth verified; five hundred and forty-two, or 14.62 per cent., were one-half verified; six hundred and forty-one, or 17.29 per cent., were three-fourths verified; 2,300, or 62.05 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During April, 1885, one hundred and eighty-three cautionary signals were ordered. Of these, one hundred and forty-nine, or 81.42 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Thirty-seven off-shore signals were ordered, of which number, twenty-nine, or 78.38 per cent., were fully justified both as to direction and velocity; thirty-four, or 91.89 per cent., were justified as to direction; and thirty-two, or 86.49 per cent., were justified as to velocity. Two hundred and twenty signals of all kinds were ordered, one hundred and seventy-eight, or 80.9 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, twenty-six were changed from cautionary. Five signals were ordered late. In ninety-three cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During April, 1885, there were seventy-six cold-wave signals

ordered, of which number sixty-six, or 86.8 per cent., were justified.

RAILWAY WEATHER SIGNALS.

The following extract is from the April report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr.:

Since the last bulletin was issued the Northeastern railroad of Georgia and the division of the East Tennessee, Virginia and Georgia railroad system, extending from Rome, Georgia, to Selma, Alabama, have been added to the service; on the latter road the signals are exposed on the trains and not at the stations, as at other points in the state. Besides the roads mentioned, stations along the Western, the South and North, the Mobile and Girard, the Montgomery and Mobile, Atlanta and West Point, and the Georgia Pacific railroads have furnished reports which show the verification of predictions to be, for the whole state, 92 per cent. for temperature and 91 per cent. for weather.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; and the mean temperature of the air at the station. Observations were interrupted by ice during the month as follows: Grand Haven, Michigan, from 1st to 4th; Toledo, Ohio, from 1st to 5th; Detroit, Michigan and Sandusky, Ohio, from 1st to 6th; Cleveland, Ohio, from 1st to 11th; Buffalo, New York and Milwaukee, Wisconsin, from 1st to 18th; Alpena, Michigan, from 1st to 20th; Detroit, Michigan, on 21st and 22d; Duluth, Minnesota, from 1st to 28th; Escanaba and Mackinaw City, Michigan, throughout the month.

Temperature of water for April, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	56.0	43.1	12.9	4 3	46.6
Alpena, Michigan*	40.0	31.5	8.5	12 2	34.7
Augusta, Georgia	72.0	58.0	14.0	7 6	63.0
Baltimore, Maryland	59.2	39.4	19.8	10 2	54.2
Block Island, Rhode Island	45.6	38.0	7.6	7 3	44.6
Boston, Massachusetts	51.3	33.7	17.6	21 3	45.3
Buffalo, New York*	44.1	33.5	10.6	8 0	39.9
Canby, Fort, Washington Territory	54.3	49.1	5.2	14 9	48.9
Cedar Keys, Florida	78.8	67.1	11.7	8 4	69.4
Chicago, Illinois	52.9	39.7	13.2	7 4	45.3
Charleston, South Carolina	68.5	54.0	14.5	41 0	61.8
Chillicothe, Virginia	64.2	37.0	27.2	2 9	50.8
Cleveland, Ohio*	46.8	35.6	11.2	14 0	44.0
Detroit, Michigan*	46.2	34.0	12.2	24 4	45.1
Duluth, Minnesota*	35.9	35.6	0.3	9 8	36.8
Eastport, Maine	37.4	33.5	3.9	15 1	39.8
Escanaba, Michigan*	77.4	64.5	12.9	12 9	71.9
Galveston, Texas	59.6	32.7	26.9	19 0	42.7
Grand Haven, Michigan*	77.5	67.5	10.0	9 0	71.5
Indianola, Texas	76.8	65.3	11.5	18 0	67.7
Jacksonville, Florida	83.7	74.6	9.1	17 0	76.0
Key West, Florida	69.1	49.6	19.5	5 8	58.9
Mackinaw City, Michigan*	45.1	39.1	6.0	8 0	40.4
Marquette, Michigan	73.5	58.8	14.7	18 1	66.2
Milwaukee, Wisconsin*	54.5	38.1	16.4	16 4	46.0
Mobile, Alabama	45.7	35.1	10.6	11 7	47.0
New Haven, Connecticut	48.8	36.8	12.0	13 7	47.7
New London, Connecticut	64.3	47.8	16.5	10 5	57.1
New York City	71.9	60.3	11.6	17 0	67.0
Norfolk, Virginia	45.4	33.3	12.1	10 7	45.1
Pensacola, Florida	57.4	51.1	6.3	57 5	53.1
Portland, Maine	54.0	35.0	19.0	10 0	44.9
Sandusky, Ohio*	59.5	40.2	19.3	1 6	47.2
Sandy Hook, New Jersey	59.9	56.9	3.0	35 8	57.1
San Francisco, California	73.0	58.8	14.2	9 3	65.9
Savannah, Georgia	67.2	50.6	16.6	10 9	59.2
Smithville, North Carolina	59.2	39.2	20.0	12 9	49.0
Toledo, Ohio*	66.0	51.0	15.0	14 8	61.8
Wilmington, North Carolina					

* Observations interrupted by ice—see text.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were not numerous during April, 1885. The principal and most extensively observed display was that of the 7-8th; it was reported from stations in the north Pacific coast region, the extreme northwest, Mississippi and Missouri valleys, and in northern Maine. This display was not noticed in the lake districts, owing probably to the cloudiness which prevailed in that region.

Table of miscellaneous meteorological data for April, 1885—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).					Temperature of the air (in degrees Fahrenheit).										Winds.													
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.			Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Max. velocity.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.		
					Highest barometer.	Lowest barometer.				Max.	Min.		Greatest.	Least.																
New England.																														
Eastport.....	61	29.86	+0.08	29.93	30.46	29.39	51.07	39.8	+1.8	66.2	20.46.0	23.2	10.33.9	43.0	27.2	20	3.0	13.67.8	29.2	5.35	+1.68	6,760	s.	48	e.	4	14	7	14	9
Portland.....	45	29.91	+0.05	29.96	30.52	29.43	41.09	40.1	+2.8	71.9	24.55.3	28.4	9.38.4	43.5	29.5	20	3.7	4.05.4	34.1	2.09	-0.93	6,296	nw.	36	ne.	29	9	6	10	14
Mount Washington.....	6,279	23.60	.....	30.00	30.56	29.49	61.07	23.0	+2.1	56.5	24.31.0	-10.3	9.15.6	66.8	30.4	2	5.6	17.90.6	20.4	2.66	-1.62	25,070	nw.	96	nw.	27	17	5	15	10
Thatcher's Island.....	48	29.84	+0.06	29.97	30.55	29.20	29.1	35.46.3	+2.4	62.4	24.56.4	27.2	10.38.4	55.2	33.4	3	3.3	4.04.2	33.6	3.30	-0.76	9,323	w.	50	n.	29	10	7	7	15
Boston.....	122	29.84	+0.06	29.97	30.55	29.20	29.1	35.46.3	+2.4	65.0	22.50.3	27.0	11.36.0	38.0	27.2	21	5.9	26.70.9	37.6	2.25	-0.93	8,762	sw.	44	n.	29	7	5	12	13
Point Judith.....	60	29.90	.....	29.99	30.54	29.23	29.1	31.44.6	+1.8	69.9	22.53.1	27.4	9.38.5	42.5	23.5	22	5.9	26.70.9	37.6	2.65	-0.93	8,762	sw.	44	n.	29	7	5	12	13
Block Island.....	27	29.97	.....	29.99	30.54	29.23	29.1	31.44.6	+1.8	71.0	22.55.3	27.0	9.35.7	44.0	23.5	22	5.9	26.70.9	37.6	2.67	-0.93	8,762	sw.	44	n.	29	7	5	12	13
Narragansett Pier.....	47	29.98	+0.12	30.02	30.56	29.29	29.1	27.47.0	+2.1	77.9	22.55.7	26.3	10.38.1	51.6	29.3	21	6.2	26.66.2	35.2	3.34	-0.57	5,711	n.	29	nw.	6	9	5	9	16
New Haven.....	107	29.90	.....	30.01	30.56	29.34	29.1	22.46.0	+0.4	83.0	22.56.1	23.3	9.36.5	59.7	31.0	19	9.0	26.65.6	33.6	2.31	-1.85	5,856	s.	35	nw.	29	9	4	11	15
Middle Atlantic states.																														
Albany.....	75	29.95	+0.10	30.03	30.59	29.52	28.1	07.45.3	+0.1	84.6	22.57.3	23.5	9.35.2	61.1	35.0	20	8.7	6.62.5	31.9	2.89	+0.09	5,125	nw.	32	sw.	2	10	7	12	11
New York City.....	104	29.86	+0.03	30.03	30.61	29.40	29.1	15.47.7	+0.4	81.5	22.58.3	23.9	9.39.7	54.6	30.3	21	8.7	15.07.8	36.7	2.44	-0.77	6,838	nw.	45	w.	6	9	7	8	15
Sandy Hook.....	28	30.01	+0.03	30.03	30.60	29.49	29.1	11.47.2	+1.0	80.5	22.58.3	28.0	9.39.5	52.5	31.9	21	6.2	26.68.7	36.5	2.47	-2.68	11,987	w.	64	nw.	29	12	7	10	13
Barnegat City.....	22	30.01	+0.07	30.02	30.60	29.45	29.1	11.47.2	+1.0	72.0	27.55.0	28.4	9.39.4	43.6	27.2	21	5.2	18.76.6	40.0	0.89	-2.92	10,491	nw.	46	nw.	29	10	4	10	16
Little Egg Harbor.....	13	30.01	+0.06	30.01	30.59	29.46	29.1	11.47.2	+1.0	70.8	27.55.2	27.8	9.39.2	43.0	27.2	21	4.0	28.5.4	41.6	1.07	-1.98	5,281	nw.	30	nw.	29	6	4	13	13
Atlantic City.....	27	30.01	+0.06	30.02	30.59	29.45	29.1	11.47.2	+1.0	82.5	27.55.8	31.0	9.41.8	51.5	32.0	17	6.8	12.79.3	42.5	1.87	-3.31	10,909	s.	70	nw.	29	8	4	16	10
Cape May.....	117	29.92	+0.07	30.04	30.60	29.50	29.1	11.47.2	+1.0	86.8	22.60.9	26.6	9.40.4	60.2	30.9	21	9.3	11.67.8	38.0	2.54	-0.50	7,511	w.	47	nw.	29	8	4	16	10
Philadelphia.....	45	30.01	+0.06	30.04	30.59	29.55	28.1	04.54.2	+1.0	81.5	23.04.0	31.5	14.45.3	50.0	27.1	21	9.8	10.56.2	37.5	1.37	-1.82	4,333	nw.	31	nw.	29	9	8	11	11
Baltimore.....	106	29.96	+0.06	30.00	30.61	29.55	29.1	06.53.1	+0.5	86.3	22.64.5	30.2	14.42.8	56.1	34.9	22	9.1	10.59.4	37.7	1.71	-1.28	4,947	nw.	32	nw.	29	9	5	14	11
Washington City.....	20	.....	.....	.....	.....	.....	.....	.....	.....	70.0	22.55.3	31.2	5.40.8	37.8	.....	.....	.....	.....	.....	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Delaware Breakwater.....	8	30.05	+0.07	30.04	30.58	29.50	29.1	06.53.1	+0.5	81.0	22.56.7	31.0	11.41.5	50.0	32.2	22	8.7	16.74.8	42.4	0.97	-1.42	7,694	s.	50	nw.	29	7	9	14	.....
Ocean City.....	16	30.05	+0.08	30.05	30.58	29.58	29.1	06.53.1	+0.5	75.9	20.62.0	37.7	11.40.8	41.2	23.9	15	6.3	17.70.8	44.1	1.45	-4.04	9,649	s.	50	nw.	29	7	3	14	13
Chincoteague.....	30	30.02	+0.06	30.03	30.54	29.61	28.0	09.57.1	+1.5	81.4	24.66.2	34.9	11.47.9	46.5	30.0	21	4.3	17.02.2	40.3	1.92	-2.20	5,804	ne.	26	nw.	13	11	7	12	.....
Cape Henry.....	652	29.96	+0.06	30.04	30.58	29.61	30.0	07.55.0	+1.0	84.9	23.07.2	32.1	11.43.9	52.8	36.3	22	9.9	10.61.6	40.1	1.39	-2.16	3,210	sw.	24	nw.	13	9	6	12	.....
South Atlantic states.																														
Kitty Hawk.....	22	30.06	+0.05	30.05	30.55	29.55	41.00	54.3	+0.2	80.1	26.62.7	34.7	14.40.8	45.4	28.5	7	2.1	18.80.2	47.9	3.95	-1.81	10,126	ne.	44	n.	9	12	7	8	15
Hatteras.....	12	30.06	+0.06	30.05	30.52	29.61	41.00	54.3	+0.2	76.0	26.65.9	38.0	15.51.8	38.0	26.1	15	4.4	18.78.4	51.0	3.10	-2.62	7,756	ne.	38	ne.	29	10	4	13	13
Fort Macon.....	11	30.06	+0.06	30.04	30.52	29.61	30.0	51.58.9	+1.8	77.3	26.05.4	34.8	14.51.8	42.5	21.2	11	5.8	17.82.9	53.5	2.33	-1.92	10,219	sw.	35	n.	10	12	6	11	13
New River Inlet.....	52	30.02	+0.05	30.05	30.51	29.63	30.88	61.8	+0.5	83.7	26.71.2	37.3	14.52.5	46.4	29.5	6	8.2	9.04.6	48.4	3.05	-0.31	5,545	sw.	27	w.	8	9	4	14	12
Wilmington.....	34	30.04	+0.05	30.05	30.51	29.63	30.88	61.8	+0.5	75.8	25.06.8	33.2	14.51.0	42.6	28.0	11	5.5	12.78.9	52.3	1.91	-1.57	7,359	sw.	26	sw.	8	9	5	11	14
Smithville.....	808	29.23	+0.08	30.06	30.54	29.67	30.87	59.4	+0.5	84.8	25.70.6	33.5	14.48.8	51.3	32.0	11	6.2	18.59.8	43.7	2.83	-2.01	4,499	sw.	23	nw.	13	9	8	8	14
Charlotte.....	1,129	28.91	+0.06	30.07	30.46	29.80	30.60	61.1	+0.3	83.4	25.70.6	35.8	14.51.5	47.7	28.5	10	10.0	18.55.0	42.5	1.31	-4.51	7,439	nw.	30	nw.	4	10	7	12	11
Augusta.....	183	29.92	+0.07	30.07	30.49	29.70	30.70	63.0	+1.0	92.8	25.77.6	35.1	14.51.4	57.7	37.9	11	11.0	18.03.7	47.6	1.68	-2.91	2,902	se.	20	n.	17	7	4	12	14
Charleston.....	52	30.02	+0.05	30.04	30.45	29.64	30.82	63.8	+0.7	83.9	25.71.8	43.0	14.50.7	40.9	23.5	10	6.5	27.69.5	52.6	1.17	-3.75	5,746	sw.	36	ne.	19	6	1	17	12
Savannah.....	17	30.00	+0.05	30.06	30.44	29.68	30.77	65.9	+0.4	86.9	25.74.3	43.0	14.57.4	44.7	23.5	10	6.5	18.66.5	53.0	1.14	-3.64	5,899	s.	31	ne.	19	6	15	13	.....
Jacksonville.....	43	30.04	+0.05	30.05	30.36	29.74	30.62	67.7	+1.8	87.8	27.77.2	46.8	14.59.9	41.0	26.2	24	5.9	19.73.8	58.2	1.24	-2.22	4,900	ne.	24	ne.	20	5	2	17	11
Cape Lookout.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79.1	26.07.2	34.0	14.51.4	45.1	.....	.....	.....	.....	.....	3.34	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portsmouth.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75.0	25.65.8	40.0	11.52.8	35.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Florida peninsula.																														
Sanford.....	50	30.06	.....	30.09	30.35	29.83	30.52	71.0	.....	90.9	27.83.1	52.1	6.62.2	38.5	29.4	6	6.0	19.70.3	59.5	1.52	.....	4,262	ne.	27	ne.	20	4	1	12	17
Cedar Key.....	22	30.04	+0.01	30.02	30.27	29.76	30.51	69.4	+1.1	82.3	26.79.9	50.5	14.63.4	31.8	25.1	14	6.0	37.2.8	59.0	0.15	-2.83	6,118	w.	43	s.	3	2	3	14	13
Key West.....	20	30.03	+0.02	30.00	30.15	29.89	30.27	76.0	+0.9	80.3	30.81.8	67.4	16.71.9	19.0	16.8	10	4.8	13.74.5	67.0	0.47	-0.92	7,511	e.	32	n.	21	4	3	17	10
Eastern Gulf states.																														
Montgomery.....	219	29.84	+0.04	30.04	30.38	29.77	30.61	65.8	+0.9	86.1	25.76.8	38.5	4.55.6	47.6	31.8	5	9.2	26.64.4	51.7	3.92	-2.54	4,203	nw.	20	nw.	3	8	4	17	9
Pensacola.....	30	30.0																												

Table of miscellaneous meteorological data for April, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).				Temperature of the air (in degrees Fahrenheit).														Winds.												
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Highest barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Daily ranges.				Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Max. velocity.											
						Date.	Lowest barometer.				Max.	Date.	Mean max.	Min.	Date.	Mean min.						Monthly range.	Greatest.	Date.	Least.							
<i>Extreme northwest.</i>																																
Fort Buford.	1,930	27.91	-.02	30.00	30.36	11	29.50	6.08	743.5	+3.0	75.0	557.7	18.8	73.2	56.2	42.5	8.7	16.67	1.31	5	1.71	+0.43	8,446	nw.	30	w.	6	12	11	4	5	
Bismarck.	1,694	28.2	-.03	30.00	30.57	25	29.47	6.10	742.8	+2.6	71.6	534.1	18.7	73.3	52.9	38.6	4.0	20.75	0.34	3	3.21	+0.35	6,666	n.	30	s.	13	10	6	14	10	
Fort Yates.		28.30						0.80	30.89		73.9	651.7	13.7	73.1	60.2	40.3	6	3.02	77.4	32.3	3.67		8,309	nw.	54	nw.	7	10	9	11		
Moorehead.	923	28.94	-.06	29.98	30.38	12	29.34	23.10	743.0	+7.1	67.5	452.2	13.9	73.2	53.6	39.5	4	2.20	75.9	33.2	3.43	+1.43	9,273	n.	40	nw.	7	9	8	15		
Saint Vincent.	804	29.10	-.06	30.02	30.45	12	29.34	23.11	736.7	+2.1	65.2	2847.2	14.4	72.7	59.6	42.9	2	5.31	76.6	30.2	2.85	+1.85	8,999	s.	41	nw.	7	12	10	11		
<i>Upper Mississippi valley.</i>																																
Saint Paul.	801	29.10	+0.02	29.98	30.31	13	29.54	7.07	745.3	0.0	75.5	2157.8	19.6	83.7	55.5	35.0	7	11.5	107.6	38.0	3.19	+1.10	6,696	s.	40	w.	21	10	11	15	4	
La Crosse.	735	29.20	+0.03	29.98	30.32	13	29.54	7.07	745.7	-1.2	73.7	2152.9	21.6	83.8	52.1	27.3	7	11.5	106.4	35.1	1.85	+0.19	6,692	s.	32	n.	11	12	11	15	4	
Dubuque.	665	29.23	+0.03	29.99	30.34	13	29.63	10.0	747.2	+0.8	73.9	2155.8	23.4	83.9	48.5	23.4	47	5.4	107.0	37.5	2.49	+0.78	4,276	s.	18	s.	14	16	14	15	2	
Davenport.	615	29.34	+0.04	29.99	30.36	13	29.62	10.0	754.9	+2.4	74.0	2158.0	26.1	84.1	49.5	25.6	6	5.1	107.2	40.3	3.67	+0.60	7,542	nw.	30	sw.	21	15	15	15	3	
Des Moines.	849	29.08	+0.03	29.99	30.36	13	29.66	7.0	749.9	-0.4	70.5	2759.6	26.2	84.0	49.5	30.4	4	4.7	107.2	40.9	3.62	+0.98	4,679	s.	26	s.	21	19	15	12	3	
Keokuk.	618	29.32	+0.04	29.93	30.36	13	29.66	7.0	749.7	-1.7	76.9	2158.6	26.0	84.1	49.5	29.6	4	5.8	107.0	41.8	3.33	+0.23	7,308	s.	31	sw.	14	13	12	14	4	
Springfield.	644	29.32	+0.03	29.91	30.35	13	29.58	7.0	751.7	+1.3	76.2	2163.0	30.0	84.3	46.2	30.2	5	7.0	108.0	40.7	6.36	+3.17	7,577	s.	28	n.	3	15	15	15	5	
Saint Louis.	583	29.40	+0.04	30.00	30.35	13	29.56	7.0	752.6	+1.2	79.0	2165.7	32.1	84.8	46.2	31.8	7	6.2	108.9	44.5	4.84	+1.43	9,339	s.	36	nw.	7	14	12	11	7	
Calix.	377	29.04	+0.03	30.00	30.38	13	29.54	7.0	754.9	+1.4	81.0	2269.5	34.0	85.1	47.0	34.0	3	7.0	109.1	45.7	1.43	-2.59	8,075	sw.	32	sw.	17	10	8	17	5	
<i>Missouri valley.</i>																																
Fort Bennett.	1,510	28.35		29.99	30.39	12	29.42	21.0	747.0	+4.4	78.5	462.3	18.9	93.5	75.6	51.1	9	6.3	20.62	0.34	1.84	-0.44	7,834	n.	42	s.	13	7		9		
Fort Sully.									51.2		80.5	465.0	21.0	93.7	4.9	59.5					2.38											
Yankton.	1,228	28.66	+0.08	30.00	30.34	12	29.50	21.0	754.7	+2.0	76.7	460.7	19.2	83.9	7.5	54.0	3	12.0	16.69	1.36	5.08	+1.98	6,436	n.	41	n.	7	11	5	19	6	
Huron.	1,305	28.56		30.01	30.42	12	29.4	2	1.02	45.9	+2.3	75.3	17.9	83.4	57.4	45.7	4	5.27	65.3	34.6	1.06	-1.61	8,195	sw.	33	sw.	13	10	6	13	11	
Omaha.	1,113	28.0	+0.02	29.98	30.35	13	29.62	21.0	733.50	+1.0	77.2	559.9	20.0	84.2	49.3	33.3	1	7.2	21.72	40.8	3.4	+2.99	7,797	n.	38	nw.	10	15	11	14	5	
Leavenworth.	842	29.09	+0.03	29.98	30.40	13	29.62	16.0	78.52	+7	65.7	2002.7	30.0	84.1	49.3	39.0	10	7.02	74.74	2.63	6.03	+2.98	4,499	s.	31	s.	14	16	9	15	0	
Lamar.		29.92		30.00	30.39	13	29.62	16.0	77.55		79.4	1566.8	31.4	84.5	49.3	39.1	10	7.22	68.9	43.8	6.64		9,123	s.	40	sw.	22	11	9	18	3	
<i>Northern slope.</i>																																
Fort Assinaboine.	2,710	27.12	+0.01	30.04	30.39	11	29.53	5.08	745.2	+3.8	78.4	558.5	17.5	73.3	60.9	44.7	5	7.4	20.66	4.33	0.38	-0.51	6,378	sw.	42	nw.	6	8		11	11	
Fort Benton.	2,700	27.19		30.05	30.39	11	29.57	5.08	745.9	+3.1	79.3	561.1	20.5	79.33	58.8	45.0	26	9.50	55.2	3.9	0.64	-0.26	4,878	sw.	46	nw.	24	6	8	11	11	
Fort Shaw.	3,550	26.30		29.98	30.31	11	29.55	5.08	745.9	+3.1	79.3	561.1	17.4	19.32	59.1	49.3	12	9.92	52.5	26.9	1.00	-0.11	5,750	w.	36	w.	15	5	7	11	12	
Helena.	4,044	25.77	-0.01	29.98	30.30	11	29.56	15.0	70.45	+7	4.3	69.3	22.1	18.37	47.2	33.2	12	7.17	55.7	29.1	0.60	-0.26	5,953	sw.	36	w.	24	6	8	11	11	
Fort Custer.	3,040	26.79	+0.01	29.97	30.32	11	29.54	5.07	746.2	+2.0	76.3	560.3	22.2	12.31	64.3	44.2	5	8.31	60.4	30.5	0.50	-0.66	5,518	n.	36	n.	15	8	16	6	6	
Fort Magnums.	4,340	25.52		30.02	30.30	11	29.54	15.0	66.41	+5	71.8	555.2	19.2	18.35	63.3	63.8	12	8.4	17.58	27.2	1.00	-0.66	5,518	n.	36	n.	15	8	16	6	6	
Deadwood.	4,600	25.32	+0.03	30.01	30.30	12	29.65	6.0	744.1	+3	75.1	551.0	21.2	23.33	54.3	9.31	1	7.7	19.79	53.1	3.11	-1.94	3,276	ne.	18	ne.	6	14	3	14	3	
Cheyenne.	6,089	23.93	+0.01	29.94	30.21	11	29.55	21.0	66.40	+7	65.4	105.0	18.7	24.31	52.7	34.4	9	10.8	73.38	20.9	3.77	+2.70	7,200	nw.	40	nw.	8	12	13	9	9	
North Platte.	2,841	27.00	+0.01	29.94	30.31	12	29.40	21.0	91.51	+3	75.0	263.0	30.5	12.40	9.44	5.30	5	12.0	11.64	38.6	1.39	-0.25	7,287	sw.	48	sw.	21	6	16	6	6	
<i>Middle slope.</i>																																
Denver.	5,394	24.67	+0.02	29.93	30.27	11	29.53	21.0	74.45	+7	67.2	1058.4	17.6	24.35	44.3	36.9	9	7.3	61.7	30.7	4.94	+3.11	5,154	n.	40	nw.	8	13	13	11	7	
Pike's Peak.	14,134	17.71		29.98	30.21	9	29.45	21.0	67.15	+8	3.2	1021.5	-4.6	22.11	33.6	20.22	4	15.8	85.9	13.0	5.39	+2.07	15,017	w.	80	w.	8	21	10	13	7	
Dodge City.	2,417	27.33	+0.02	29.93	30.32	12	29.52	6.0	781.54	+4	79.0	1068.2	32.8	24.32	46.2	40.2	1	7.5	24.41	38.7	1.39	-0.15	13,233	sw.	63	sw.	20	9	3	10	7	
West Las Animas.	3,905	25.92	+0.01	29.85	30.14	26	29.43	21.0	77.53	+2	81.6	1069.2	25.8	22.39	55.8	45.8	5	8.2	32.4	33.1	0.45	-0.34	11,241	w.	40	n.	21	5	6	16		
Fort Elliott.	2,650	27.8	.00	29.94	30.27	13	29.56	6.0	71.50	+0	81.6	109.1	32.3	25.45	49.3	39.3	25	6.7	32.64	0.45	1.49	+3.93	9,795	s.	51	s.	21	9	3	18	9	
Fort Reno.									59.4		87.7	1571.9	36.5	34.9	5.12						2.88											
<i>Southern slope.</i>																																
Fort Sill.	1,200	28.68	-.02	29.99	30.22	12	29.55	6.0	76.60	-1.8	87.0	1573.2	37.2	85.0	6.49	8.39	10	9.0	22.70	48.7	3.62	+0.18	10,107	s.	80	sw.	21	10	7	11	12	
Fort Concho.	1,900	28.04	+0.01	29.95	30.22	12	29.69	6.0	73.64	-7	90.5	1179.1	43.5	25.54	2.47	4.39	17	13.2	18.70	58.5	4.76	+2.18	7,555	s.	36	sw.	11	9	6	15	9	
Fort Stockton.	3,010	26.93	+0.01	29.93	30.13	12	29.72	20.0	41.65	+4	91.0	181.5	41.2	25.41	1.93	0.23	17	10.3	58.0	48.8	0.13	-0.36	7,568	s.	40	sw.	13	8	1	12	7	
Fort Davis.	4,928	25.13		29.88	30.07	8	29.72	21.0	35.61	+0	84.3	1175.9	37.3	23.49	6.47	0.35	0	18.3	12.44	45.3	0.46	-0.14	5,818	sw.	33	sw.	20	6	3	16	11	
<i>Southern plateau.</i>																																
Fort Verde.									61.8	+2.9	87.0	1076.5	38.5	24.47	0.48	5					0.69	-0.01										
Prescott.	5,389	24.67	+0.1	29.92	30.16	8	29.65	20.0	51.51	+6	80.0	1065.3	28.5	24.38	9.51	5.39	25	15.8	23.55	7.34	2.02	-0.30	6,735	s.	35	s.	20	4	0	15	15	
Wickenburg.									62.9	+2.8	94.0	1180.9	34.4	21.45	0.50	5					0.57	+0.00										
Phoenix.									65.0	+1.4	98.6	1489.6	30.2	24.40	5.64	8					0.00	-0.40										
Fort Grant.	4,895	25.17		29.97	30.10	8	29.73	20.0	33.57	+8	81.7	1072.6	36.2	21.48	4.55	5.33	1.26	16.6	15.40	39.3	0.04	-0.21	5,268	n.	28	w.	12	1	1	9	20	
Fort Thomas.	2,710	27.15		29.85	30.10	8	29.68	20.0	42.00	+6	1.1	88.0	29.3	21.43	9.58	7.45	2.25	16.9	15.45	1.35	0.14	-0.15		w.								
Fort Apache.	5,050	24.98	+0.01	29.98	30.00	8	29.71</																									

* Record for twenty-four days.

† Observation for twenty-three days.

The following reports referring to the display of the 7-8th, are given:

7th.—Eastport, Maine: a brilliant auroral arch formed at 9.15 p. m., the display continuing until early morning of the 8th. A few streamers were observed between 12.15 and 1.00 a. m.

7th.—Saint Vincent, Minnesota: an aurora was observed at 9.50 p. m. extending from 165° to 250° azimuth; it consisted at first in a poorly-defined arch of 25° altitude, which, at 11 p. m., disappeared, when bright streamers shot upwards; the display continued until 3.25 a. m. of the 8th.

7th.—Moorhead, Minnesota: a faint aurora, with streamers, was observed in the northern sky from 10 p. m. until midnight.

7th.—Bismarck, Dakota: brilliant auroral streamers appeared at 9.30 p. m. on the northwestern horizon and extended to the zenith; at 10 p. m. the whole of the northern sky was covered with a brilliant sheet of light, except a dark segment rising 5° above the horizon. The display ended at 4 a. m. of the 8th; no streamers were observed after midnight.

7th.—Fort Totten, Dakota: an aurora was observed in the north, altitude 25°, azimuth 120°, it consisted of a pale light resembling twilight lasting from 9.30 p. m. until early morning of the 8th, no arch or beams were visible.

7th.—Saint Paul, Minnesota: a faint auroral arch, extending over 35° of the sky, was visible at 11.05 p. m.; at 11.20 p. m. the arch became brighter and a dark, slate-colored segment appeared beneath it. The altitude of the arch was about 25°; the display remained visible at midnight.

7th.—La Crosse, Wisconsin: an aurora was observed at 9.30 p. m.; it consisted in slender, luminous beams rising to various heights not exceeding 30°; the display continued until 2.15 a. m. of the 8th.

7th.—Huron, Dakota: a faint aurora, in the form of an arch, was visible from 10.15 p. m. until after midnight.

7th.—Spokane Falls, Washington Territory: an aurora was observed from 11.30 p. m. of the 7th until 4 a. m. of the 8th; it appeared as a bright light, the limit of which was poorly defined; altitude about 25°; azimuth about 45°; there were no streamers.

7th.—Port Angeles, Washington Territory: an aurora was observed at 11 p. m.; the dark segment was well-defined and extended to a height of 10° above the horizon. A low arch of yellowish color extended from 15° west of north to about 50° east of north; the apex of the arch was in the direction of the magnetic pole; faint streamers were also observed.

7th.—Pysht, Washington Territory: an aurora was observed at 9 p. m.; it consisted of a pale light above a dark base; the display ended at 10 p. m.

7th.—Tatoosh Island, Washington Territory: an aurora was observed from 12.05 to 2.10 a. m. of the 8th; it consisted of an arch of bluish light, extending over 45° of the horizon and to an altitude of about 30°; it was clearly defined, with a dark segment beneath.

7th.—Cresco, Iowa: faint auroral light in the north-northeast at 9.30 p. m.

7th.—Prairie du Chien, Wisconsin: a bright auroral arch of about 25° altitude was visible from 10 p. m. until 2 a. m. of the 8th.

7th.—Chester, Minnesota: from 10 p. m. until midnight; Independence, Iowa, Northfield, Minnesota, Madison, Wisconsin, at 10 p. m.

Auroral displays were reported on other dates as follows:

3-4th.—Wauseon, Ohio, faint.

6th.—Saint Vincent, Minnesota, faint auroral light in the north at 10 p. m.

8th.—Embarras, Wisconsin, and Manchester, Iowa.

9th.—Tiffin, Ohio, at 9 p. m.

10th.—Saint Vincent, Minnesota, from 10.25 to 11.40 p. m., faint, narrow belt of white light.

12th.—Saint Vincent, Minnesota, at 9 p. m., continuing throughout the night; irregular arch of pale, whitish color with a few rays shooting up at intervals; it extended from 110° to

250° azimuth. Monticello, Iowa, aurora observed at 9 p. m.; no streamers were visible.

13th.—Escanaba, Michigan, at 9.11 to 11.25 p. m., faint. Manistique, Michigan, at 8.10 p. m. Blackwell, North Carolina, faint.

14th.—Portland, Maine, faint auroral arch from 10.30 p. m. until after midnight. Eastport, Maine, auroral arch from 10 p. m. until 1.15 a. m. of the 15th; it was of a straw color and about 20° altitude. Gardiner, Maine, an aurora was visible from 10 p. m. until morning; it consisted of shooting beams above a low arch, with dark cloud below; the display was brighter at 3.15 a. m. of the 15th. Cambridge, Massachusetts, a low auroral arch was visible at 10.30 p. m., and later a dark cloud appeared below the arch.

15th.—Manhattan, Kansas, from 2 a. m. until daylight.

20th.—Philadelphia, Pennsylvania, a bright auroral arch reaching an altitude of 15°, was observed in the northwest at 3 a. m.; it continued until daybreak. Similar displays were observed on the 21st and 22d.

27th.—Moorhead, Minnesota, a faint aurora was observed from 10.30 p. m. until midnight. Fort Totten, Dakota, shooting beams of yellowish light were observed in the northern sky from 10 to 11.50 p. m. Tatoosh Island, Washington Territory, an aurora was observed at 7 a. m., (3.41 local time) extending over 30° of the horizon and to a considerable altitude; the lower part of the light was of a deep red color, changing gradually to a faint white at the upper limit; occasional streamers were observed.

ELECTRICAL PHENOMENA.

Fort Sully, Dakota: the telegraph line between this place and Bismarck was sensibly affected by atmospheric electricity on the 3d.

Fort Assinaboine, Montana, 15th: atmospheric electricity interrupted telegraphic communication from 12.01 to 1.50 p. m.

Yuma, Arizona, 19th: during a gale on this date the atmosphere was highly charged with electricity. The telephone bells rang constantly and long flashes were emitted from the switch board.

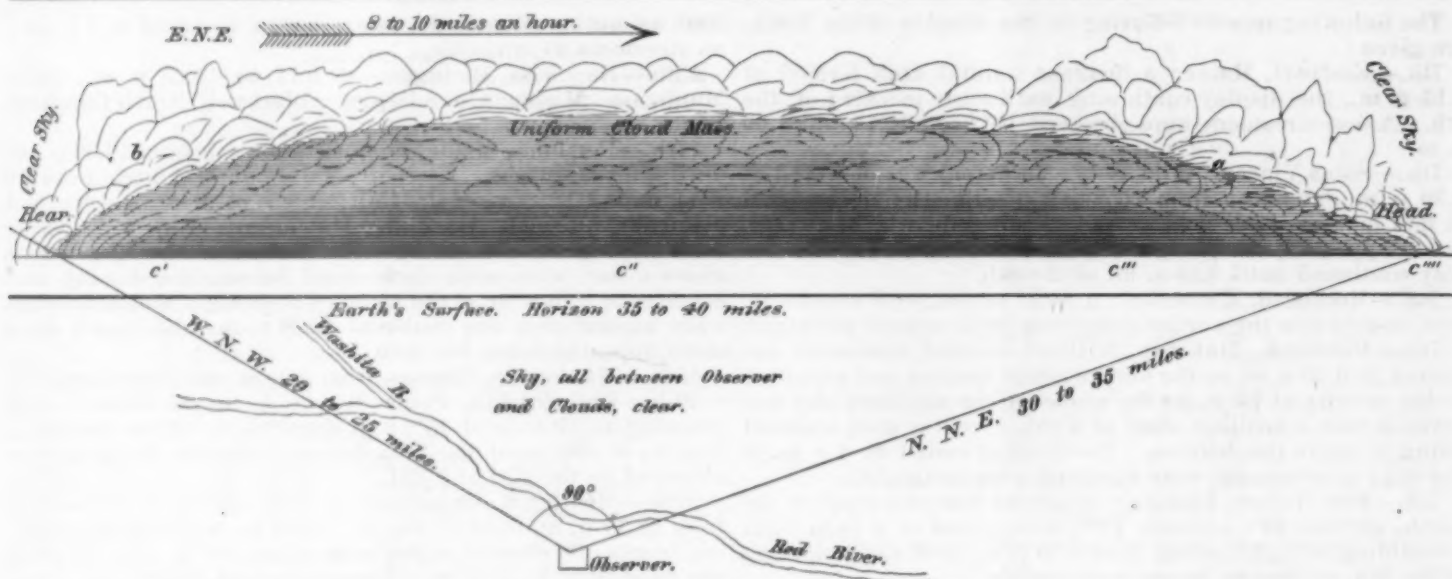
Mr. T. V. Munson, of Denison, Grayson county, Texas, has rendered an interesting account of a display of atmospheric electricity which was observed near that place between 9 p. m. on the 29th and 2 a. m. on the 30th. The accompanying illustration is as given by the observer without correcting the apparent discrepancies, as there was no time for the author to revise the same.

The following is a description of the phenomenon given as nearly as possible in the language of the observer: "My residence stands on the south bluff of Red river and commands a view which extends from thirty to fifty miles into Indian Territory; at noon on the 29th, the weather having been cloudy and hazy with little wind, a brisk breeze sprung up, blowing at the rate of ten or twelve miles per hour from the southeast and continued until 6 p. m. when it abated somewhat; occasional flashes of lightning were observed from cumulus clouds in the southeast, north and northwest, which moved in a northeasterly direction. The whole day the main clouds had been moving in broken masses towards the northeast and above them were light feathery, spraylike clouds drifting in the opposite direction. Toward evening the clouds, moving to the northeast, gathered into long lines of the cumulo-stratus kind with belts of clear sky between.

At 9 p. m. I noticed, beyond the boundary of Indian Territory, a heavy cloud, subtending a right angle from my point of view, the head of the cloud in the north-northeast being about thirty or thirty-five, and the rear in the northwest about twenty or twenty-five miles from my place of observation, as near as I could estimate.

The cloud was about from thirty-five to forty miles in length, with a depth of at least one mile, and moved at the rate of eight or ten miles an hour.

The following is an illustration of the cloud as I observed it from 9 to 10 p. m.:



At the points marked *a* and *b*, but at no other place, rapid flashes of lightning, with now and then a bolt toward the earth, were playing; at *c'* *c''* *c'''* and *c''''*, the gray region between the cloud and the earth and which was evidently the region of falling rain, as shown by the flashes of lightning, the strange phenomenon occurred. This region, for brevity's sake, I will designate 'rain-region.'

At intervals of from one to two minutes (the lightning at *a* and *b* increasing from beginning to close of each interval) the entire rain-region would glow with a faint white light for about one or two seconds, rarely longer, in appearance similar to the auroral light. This light seemed to spring up at *c'* first, and, getting brighter while running to *c''''*, cease suddenly; immediately afterward the lightning at *a* and *b* would be least vigorous. The phenomenon continued to repeat itself during the hour that I observed the cloud; at first I supposed it to be a kind of sheet-lightning, but afterward, when watching it intently, I could see no signs of lightning proper, only a steadily increasing glow, which would remain along the entire rain-region for a second or two and then cease more suddenly than it came.

There were no streaks or flashes of lightning running through the cloud, which seemed to have a uniform density throughout its length from *a* to *b*, and this glow could not have been the reflected light from the flashes which occurred at either end of the cloud, as I carefully noted that the brightest flashes produced no such effect. Had the glow been reflected light, it would have been in flashes like the flash producing it.

At 2 a. m. on the 30th, I observed in the west and north an inky black cloud rapidly approaching from that direction in one long line accompanied by thunder and strong wind and followed by but little hail and little rain of large drops."

THUNDER-STORMS.

Thunder-storms occurred in the various districts on the following dates:

New England.—2d, 3d, 4th, 6th, 8th, 26th, 28th, 29th.
Middle Atlantic states.—3d, 5th, 8th, 11th, 13th, 16th, 20th, 24th to 29th.
South Atlantic states.—3d, 8th, 9th, 10th, 12th, 13th, 16th, 17th, 18th, 27th to 30th.
Florida peninsula.—1st to 10th, 12th, 17th, 18th, 19th, 24th, 30th.
Eastern Gulf states.—2d, 3d, 7th, 8th, 17th, 24th, 27th, 30th.
Western Gulf states.—2d, 3d, 5th, 6th, 7th, 9th, 11th, 14th to 25th, 28th, 29th, 30th.
Rio Grande valley.—12th, 16th, 17th, 18th, 24th, 25th.
Tennessee.—2d, 3d, 7th, 9th, 15th, 16th, 17th, 25th, 28th, 30th.
Ohio valley.—2d, 5th to 8th, 10th, 15th to 18th, 25th, 26th, 28th, 30th.

Lower lake region.—2d to 5th, 7th, 17th, 25th, 26th, 28th, 29th.

Upper lake region.—1st, 2d, 6th, 7th, 17th, 20th, 25th, 27th, 28th.

Extreme northwest.—6th, 11th, 15th, 17th, 18th, 21st, 22d, 24th.

Upper Mississippi valley.—1st, 2d, 5th, 7th, 10th, 12th, 15th, 16th, 17th, 20th, 21st, 22d, 25th, 26th, 28th, 30th.

Missouri valley.—1st, 2d, 3d, 5th to 8th, 10th, 11th, 12th, 14th to 30th.

Northern slope.—5th, 18th, 21st, 24th, 29th.

Middle slope.—1st to 6th, 8th, 13th, 14th, 15th, 18th to 21st, 24th, 27th, 28th, 29th.

Southern slope.—1st, 5th, 11th, 13th, 14th, 17th, 19th to 22d, 29th.

Southern plateau.—3d, 12th to 15th, 18th, 26th, 30th.

Middle plateau.—1st, 4th, 13th, 14th, 28th, 29th, 30th.

Northern plateau.—Boisé City, Idaho, 12th, 27th.

North Pacific coast region.—Roseburg, Oregon, 2d, 11th; Eola, Oregon, 12th.

Middle Pacific coast region.—2d, 4th, 7th to 12th, 15th, 19th, 26th, 30th.

South Pacific coast region.—San Diego, California, 13th; Los Angeles and Cahuenga valley, California, 27th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arizona.—25th.
Arkansas.—1st, 5th, 6th, 10th, 16th, 18th, 23d, 27th, 29th, 30th.
California.—1st, 3d, 5th, 6th, 9th, 11th, 12th, 18th, 23d, 24th, 25th.
Connecticut.—1st, 7th.
Dakota.—4th, 8th, 11th, 21st, 23d, 24th.
District of Columbia.—17th, 30th.
Florida.—4th, 12th, 13th, 15th, 17th, 20th, 21st, 22d, 25th, 30th.
Georgia.—4th, 6th, 22d, 29th, 30th.
Illinois.—1st, 6th, 8th, 9th, 11th, 20th, 27th, 29th.
Indiana.—1st, 9th, 21st, 23d.
Iowa.—8th, 11th, 12th, 24th, 25th, 27th, 28th, 29th.
Kansas.—8th, 16th, 20th, 26th, 27th.
Louisiana.—1st, 25th.
Maine.—19th, 26th.
Maryland.—17th, 18th.
Massachusetts.—7th, 9th, 11th, 15th, 28th.
Michigan.—1st, 4th, 5th, 9th, 10th, 14th, 16th, 17th, 18th, 25th, 26th, 27th.

Minnesota.—8th.
 Missouri.—18th, 27th.
 Nebraska.—7th, 10th, 12th, 21st, 22d, 26th, 28th.
 Nevada.—12th.
 New Jersey.—7th, 17th, 28th.
 New York.—1st, 6th, 7th, 9th, 11th, 18th, 30th,
 North Carolina.—3d, 10th, 12th, 15th, 17th.
 Ohio.—1st, 2d, 5th, 10th, 14th, 16th, 21st, 25th.
 Oregon.—23d, 24th, 25th, 27th.
 Pennsylvania.—2d, 17th, 18th, 21st, 26th, 28th, 30th.
 Rhode Island.—1st, 7th, 11th, 15th, 28th.
 South Carolina.—7th.
 Tennessee.—2d, 12th, 14th, 21st, 26th, 27th, 29th.
 Texas.—4th, 11th, 16th.
 Utah.—25th.
 Virginia.—5th, 9th, 14th, 17th, 22d, 24th, 26th, 30th.
 Washington Territory.—8th, 20th, 23d.
 Wisconsin.—4th, 27th.
 Wyoming.—3d, 12th, 13th, 15th, 16th, 18th, 19th, 25th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories as follows:

Alabama.—27th.
 Arizona.—3d, 21st, 22d, 25th.
 Arkansas.—21st, 26th, 28th, 29th.
 California.—23d to 26th.
 Colorado.—26th.
 Connecticut.—25th.
 Dakota.—22d to 26th.
 Florida.—20th to 27th, 30th.
 Georgia.—24th, 26th, 27th, 29th.
 Illinois.—21st, 27th.
 Indiana.—20th, 21st, 23d, 24th, 27th, 29th.
 Iowa.—1st, 20th, 22d, 23d, 24th, 26th, 27th, 28th.
 Kansas.—4th, 20th, 24th, 26th, 27th, 28th.
 Kentucky.—20th, 23d, 27th.
 Louisiana.—19th, 24th.
 Maine.—20th, 23d, 27th.
 Maryland.—1st, 18th.
 Massachusetts.—7th, 25th.
 Michigan.—1st, 20th, 23d to 27th.
 Minnesota.—23d, 26th, 28th.
 Missouri.—1st, 24th, 26th, 28th.
 Montana.—Fort Shaw, 23d.
 Nebraska.—19th, 21st, 22d, 26th.
 Nevada.—24th, 25th.
 New Hampshire.—30th.
 New Jersey.—1st, 2d, 24th, 27th.
 New York.—1st, 25th, 27th, 30th.
 North Carolina.—1st, 20th, 21st, 23d, 26th to 29th.
 Oregon.—20th, 23d, 24th, 25th.
 Pennsylvania.—18th, 21st, 25th, 27th.
 Rhode Island.—25th.
 South Carolina.—22d, 28th.
 Tennessee.—1st, 2d, 20th, 21st, 23d, 25th, 26th, 27th, 29th, 30th.
 Texas.—1st, 23d, 24th, 25th, 27th, 28th, 30th.
 Virginia.—1st, 2d, 22d, 24th to 28th.
 Washington Territory.—21st, 24th, 25th.
 Wisconsin.—1st, 24th, 26th, 27th.
 Wyoming.—Fort Bridger, 23d.

The phases of the moon during April were: last quarter, 7th, 9.36 a. m.; new moon, 15th, 12.46 a. m.; first quarter, 21st, 6.14 p. m.; full moon, 29th, 1.08 a. m.; apogee, 6th, 11.30 a. m.; perigee, 18th, 9.48 a. m.

MIRAGE.

Milwaukee, Wisconsin: on the 26th, at 2 p. m., Racine Point, twenty-five miles south of Milwaukee, was plainly visible.

Duluth, Minnesota, 30th: three small islands on the south shore of Lake Superior, ordinarily not visible, were plainly seen on this date.

Mackinaw City, Michigan 4th.

Saint Vincent, Minnesota, 2d, 4th.

Fort Totten, Dakota, 12th.

Webster, Dakota, 1st, 2d, 4th, 5th, 8th, 9th, 11th, 12th, 14th, 15th, 17th, 18th, 23d, 24th, 26th, 28th, 29th, 30th.

Sherlock, Kansas, 6th, 15th, 16th, 28th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-four stations show 4,897 observations to have been made, of which seven were reported doubtful; of the remainder, 4,890, there were 4,205, or 86.0 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for April, 1885:

Date— April, 1885.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 10 a. m.	0	0	0	0	0	0	3	50†	
4, 4 p. m.	3	20†	0	0	1	8†	0	50†	
5, 1 p. m.	0	30†	0	15†	0	0	5	60†	
6, 5 p. m.	1	5†	0	10†	1	1	0	50†	
9, 12 m.	1	45†	0	0	0	0	4	90†	
11, 10 a. m.	1	30†	0	0	0	3	5	120†	
14, 6 p. m.	0	0	0	0	0	0	2	40†	
16, 5 p. m.	0	0	0	0	0	0	2	30†	
18, 6 p. m.	0	0	0	0	0	0	1	10	
20, 6 p. m.	2	5	0	0	1	3	3	15†	
22, 6 p. m.	0	5†	0	0	0	0	3	20†	
23, 10 a. m.	0	10†	0	0	0	0	3	30†	
25, 10 a. m.	0	0	0	0	0	0	3	25†	
27, 12 m.	3	10†	0	0	1	3	6	35†	
30, 12 m.	1	25†	0	0	1	5	7	50†	

Faculae were seen at the time of every observation. †Approximated.

Professor Carpenter, of Lansing, Michigan, reports sun spots during the month of April as follows:

1st, 2 groups, 20 spots; 4th, 3 p. m., 3 groups, 17 spots; 6th, 3 p. m., 5 groups, 40 spots; 18th, 1 p. m., 2 groups, 13 spots; 21st, 2.45 p. m., 4 groups, 30 spots; 25th, 5 groups, 16 spots; 29th, 3 p. m., 5 groups, 28 spots. On account of cloudy weather, which prevailed during the greater part of the month, the above were the only observations made.

EARTHQUAKES.

The following notes, referring to the earthquakes which have occurred in California during April, 1885, are taken from the reports of Signal Service and voluntary observers and from various newspapers published in California:

Salinas, Monterey county, 2d: at about midnight an earthquake shock was felt, its probable oscillation was from north to south.

Fresno, Fresno county, 2d: a sharp shock of earthquake was felt at this place this morning about 7.25 o'clock. The shock appeared to come from the east. (*San Francisco Evening Bulletin*, April 2d.)

Merced, Merced county, 2d: a heavy shock of earthquake was felt here at 7.25 this morning. It was noticed by many persons in different parts of the town, but most sensibly in the third and fourth stories of El Capitan Hotel. (*San Francisco Evening Bulletin*, April 2.)

Sacramento, Sacramento county, 3d: earthquake shocks were felt at 10.15 a. m., lasting a few seconds; two distinct shocks occurred with a motion from northeast to southwest.

San Buenaventura, Ventura county, 7th: two distinct shocks of earthquake were felt here this morning at 2 o'clock. The shocks were from northeast to southwest. (*Sacramento Daily Record Union*, April 8.)

Bakersfield, Kern county, 7th: a shock of earthquake occurred here at 2.30 a. m.; it lasted about two seconds, and the motion was from north to south. It was followed by a rumbling

noise, and the trembling of the earth lasted nearly a minute. (*Sacramento Daily Record Union*, April 8.)

Santa Barbara, Santa Barbara county, 7th: a heavy shock of earthquake was felt here at about 2 a. m. (*San Francisco Daily Examiner*, April 9.)

Salinas, Salinas county, 11th: at 7.45 p. m. an earthquake shock, with a motion from north to south, was felt; it began as a light shock, suddenly turning to an up and down motion which was quite severe; it then ended as it had begun—with a light rolling motion. The observer did not notice the length of time it lasted, but its duration was longer by far than any shock he has hitherto experienced. Buildings creaked strangely and people everywhere fled to the streets.

San Rafael, Marin county, 11th: an earthquake shock was felt at 8.06 a. m.; it had a long and slow motion from southwest to northeast.

Sacramento, Sacramento county, 11th: earthquake shocks occurred at 11.05 p. m., lasting several seconds; there were two shocks, the motion being from west to east.

San Francisco, 11th: a shock of earthquake was felt at 11.05 p. m.; it was very slight but continued for about twenty seconds, the movement being from east to west.

Keeler, Inyo county, 11th: a slight earthquake shock occurred at 11.05 p. m. (eastern time); a gentle tremor, which lasted about two seconds, was felt; its direction was from northwest to southeast, or parallel with the course of the valley.

Fresno, Fresno county, 11th: a sharp shock of earthquake was felt here at 8.03 p. m. (*San Francisco Daily Alta California*, April 12.)

Marysville, Yuba county, 11th: at 8.05 p. m., a slight shock of earthquake occurred at this place. (*San Francisco Daily Alta California*, April 12.)

San José, Santa Clara county, 11th: a shock of earthquake was felt here at 8.05 p. m. It was from east to west and lasted about twenty seconds. (*San Francisco Daily Alta California*, April 12.)

Monterey, Monterey county, 11th: the heaviest shock of earthquake since 1868 visited this place at about 8.10 p. m. The shock had the semblance of a continuous, rolling wave, traveling from west to east, and was preceded by a rumbling noise closely resembling that made by a runaway wagon. * * * Little damage was done further than the enlarging of cracks made by previous shocks in the adobe buildings. A few more shakes will render many of the adobes unsafe as dwellings or stores. (*San Francisco Daily Alta California*, April 13.)

Ione, Amador county, 11th: an earthquake shock occurred here at 8.15 p. m.; it lasted about fifteen seconds. The oscillation was from south to north. This is the second shock that has occurred here within the last two weeks. (*San Francisco Daily Alta California*, April 13.)

Hanford, Tulare county, 11th: at 8.10 p. m., a very perceptible shock of earthquake was felt here, lasting twenty seconds. A lighter shock was noticed this morning (April 12th). (*San Francisco Daily Alta California*, April 13.)

Keeler, Inyo county, 18th.—An earthquake shock, lasting about three seconds, occurred shortly before midnight (local time), the exact time being unknown. The shock was sufficiently severe to disturb people who were asleep; it was preceded by a loud report, as of an explosion.

Hydesville, Humboldt county, 25th.—A light shock of earthquake was felt at 8.20 p. m.

Blue Lake, Humboldt county, 25th.—An earthquake shock occurred at about 7.30 p. m., lasting a few seconds; the motion was apparently from south to north.

Professor C. G. Rockwood of Princeton, New Jersey, furnishes the following:

The New Haven Palladium, April 30th, 1885, contained this:

GUILFORD, NEW HAVEN COUNTY, April 28, 1885.—A severe earthquake shock was felt here about ten minutes past five o'clock this afternoon. It was followed by heavy thunder. Windows rattled and houses shook from stem to stern. Crockery fell from the shelves in many houses, causing gen-

eral consternation among the inhabitants. The movement seemed to be from west to east and lasted about one second. Lightning, rain, and thunder followed about half past five o'clock.

The following notes are taken from "Nature" of April 16, 1885:

A sharp shock of earthquake was felt in Rome on the night of the 9th instant. Bells were set ringing, and many persons were momentarily alarmed by the movement, but that was the extent of its effect. Professor Stefano Michele de Rossi has communicated the following report to the press: "At 2.44 a. m. a distinct shock of earthquake aroused a great part of the population of Rome. From the observations obtained, it belonged to the sixth degree of the conventional scale of ten degrees for intensity. It undulated from southwest to northeast, and then from northwest to southeast. The full duration was about ten seconds, of which four were occupied by the second phase of the phenomenon. A telegram from Avezzano states that the shock was very strong there in the direction of north to south. No damage was done."

Telegrams received later from Frosinone report that a shock was felt there at the same time, with sufficient force to create general alarm among the population.

There has been a renewal of earthquake shocks in the provinces of Granada and Malaga, Spain. Early on the morning of the 11th oscillations of more or less violence are reported from Velez Malaga, Antequera, Motril, and the city of Granada itself and some surrounding villages. So far as is known there has been no loss of life or serious damage, but the panic at some places is described as intense, and the inhabitants, refusing to return to their homes, remain in the open country.

Several shocks of earthquake were felt at Geneva, Switzerland, on the 13th.

PRAIRIE AND FOREST FIRES.

Vineyard Haven, Dukes county, Massachusetts, 18th: an extensive forest fire prevailed in the woods northwest of this place, endangering the dwellings in the northern part of the town; more than two hundred acres of valuable wood were destroyed.

Auburn, Schuylkill county, Pennsylvania, 19th: a forest fire burned over about one hundred acres of woodland near this place, endangering a number of dwellings.

Athens, Clarke county, Georgia: forest fires destroyed a considerable quantity of fencing northeast of this place on the 21st.

Erie, Pennsylvania: on the 21st it was reported that more than one hundred acres of forest and farm land between Fairview and Girard, in this county, were burned over by forest fires.

Petersburg, Virginia, 22d: much valuable timber has been destroyed in Dinwiddie county.

Wilton, Camden county, New Jersey, 22d: forest fires have caused much damage at Hayes' Mill and in the forests south of this place.

Atco, Camden county, New Jersey, 23d: it is estimated that the damage to buildings, forests and other property, caused by forest fires, will aggregate \$80,000.

Mount Carmel, Northumberland county, Pennsylvania, 23d: during the last two days much valuable lumber in the pine forests of this region has been destroyed by fires.

Williamstown, Gloucester county, New Jersey, 23d: about two hundred acres of cedar timber have been burned in this section and much other damage has been caused by forest fires.

Huntingdon, Huntingdon county, Pennsylvania, 24th: forest fires burned over an area of about 3,500 acres in extent in Diamond valley, causing a large amount of damage.

Blue Rock, Chester county, Pennsylvania, 24th: more than two hundred acres of woodland near here have been destroyed by forest fires.

Dennisport, Barnstable county, Massachusetts: a large tract of woodland between North Harwich and South Dennis, in this county, was burned over on the 25th. More than two hundred acres of standing timber with several barns and other buildings were burned.

Staunton, Virginia, 29th: reports from Allegheny, Augusta, Highland, Rockbridge and Rockingham counties, state that forests and fencing in those counties have been destroyed by forest fires.

Prairie and forest fires have also been reported from the following places:

Voluntown, Connecticut, 25th.
 Wentworth, Dakota, 10th, 11th, 14th, 17th, 24th, 27th.
 Allison, Kansas, 9th, 10th.
 Yutan, Nebraska, 15th.
 Sherlock, Kansas, 2d, 3d, 6th, 8th, 9th, 11th, 13th, 14th.
 De Soto, Nebraska, 1st, 4th.
 Red Willow, Nebraska, 27th.
 Genoa, Nebraska, 4th, 10th.
 Chambersburg, Pennsylvania, 23d, 24th.
 Brattleborough, Vermont, 19th, 22d.
 Wytheville, Virginia, 23d.
 Variety Mills, Virginia, 16th, 23d, 24th, 25th.
 Dale Enterprise, Virginia, 28th.
 Lynchburg, Virginia, 26th.
 Wilmington, North Carolina, 3d, 7th, 12th.
 Fort Yates, Dakota, 4th, 5th, 14th.
 Burlington, Iowa, 5th, 13th.
 Lamar, Missouri, 8th, 10th.
 Fort Elliott, Texas, 1st.
 Fort Sully, Dakota, 4th, 5th.
 Yankton, Dakota, 4th, 5th, 7th, 9th, 10th, 11th, 14th, 17th.
 North Platte, Nebraska, 1st, 14th.
 Fort Assinaboine, Montana, 14th.
 Dodge City, Kansas, 13th.
 Fort Reno, Indian Territory, 1st, 3d to 6th, 7th, 9th to 20th.
 Pike's Peak, Colorado, 5th, 13th.
 Fort Sill, Indian Territory, 10th, 15th.

MIGRATION OF BIRDS.

Geese flying northward.—Red Bluff, California, 4th, 5th, 22d;
 Cape Mendocino, California, 16th; New Haven, Connecticut,
 3d; Voluntown, Connecticut, 3d; Fort Bennett, Dakota, 1st,
 2d, 3d, 14th, 15th; Fort Reno, Indian Territory, 2d, 6th; Gut-
 tenberg, Iowa, 4th, 10th, 19th; Dubuque, Iowa, 14th; Cedar
 Rapids, Iowa, 1st; Bangor, Maine, 5th; Baltimore, Maryland,
 1st; Emmitsburg, Maryland, 1st; Swartz Creek, Michigan,
 16th; Saint Vincent, Minnesota, 10th, 15th; Moorhead, Min-
 nesota, 14th; Yutan, Nebraska, 2d, 25th; Little Egg Harbor,
 New Jersey, 6th; Humphrey, New York, 2d, 30th; Kitty
 Hawk, North Carolina, 25th; Albany, Oregon, 7th, 8th, 9th,
 12th, 15th, 16th; Portland, Oregon, 17th; Troy, Pennsylvania,
 3d; Nyatt Point, Rhode Island, 1st, 8th; Point Judith, Rhode
 Island, 1st, 2d, 3d, 7th, 9th; Narragansett Pier, Rhode Island,
 2d to 5th; Strafford, Vermont, 3d; Burlington, Vermont, 6th;
 Tatoosh Island, Washington Territory, 3d, 4th, 5th, 13th, 15th,
 21st, 23d to 26th, 29th, 30th; Fort Canby, Washington Terri-
 tory, 25th, 26th, 27th; Milwaukee, Wisconsin, 25th.

Geese flying southward.—Red Bluff, California, 2d; South-
 ington, Connecticut, 3d; Charleston, Illinois, 8th; North Vol-
 ney, New York, 14th.

Ducks flying northward.—Cedar Rapids and Guttenberg,
 Iowa, 1st; Independence, Iowa, 2d; Davenport, Iowa, 12th;
 Dubuque, Iowa, 19th; New Orleans, Louisiana, 28th; Saint
 Vincent, Minnesota, 15th; Cape Lookout, North Carolina, 15th;
 New River Inlet, North Carolina, 13th; Toledo, Ohio, 12th;
 Dorset, Vermont, 2d, 3d; Tatoosh Island, Washington Terri-
 tory, 12th.

Cranes flying northward.—Yutan, Nebraska, 18th; West Leav-
 enworth, Kansas, 1st; San Antonio, Texas, 10th, 18th.

METEORS.

San Francisco, California, 20th: at 2.00 a. m., a meteor was
 observed in the northwestern heavens; the sky was illuminated
 with an intense brightness; the meteor was apparently as large
 as a man's head and left a trail which remained visible from
 one to two minutes.

Webster, Dakota, 2d: a bright meteor flashed across the
 heavens at 9.40 p. m. It started about 3° south of Jupiter and
 moved in an easterly direction, leaving a long trail behind it.

Indianola, Texas, 18th: at 11.25 p. m., a beautiful meteor
 shot across the sky from a point apparently near the "Great
 Bear" to within 18° of the horizon; before disappearing it burst
 in many fragments.

Meteors were also observed at the following places:

Yuma, Arizona, 3d.
 North Colebrook, Connecticut, 5th.
 Voluntown, Connecticut, 13th.
 Allison, Kansas, 2d, 3d.
 Emmitsburg, Maryland, 19th, 21st.
 Taunton, Massachusetts, 14th.
 Chester, Minnesota, 30th.
 Dover, New Jersey, 20th.
 Jacksonborough, Ohio, 4th.
 Pittsburg, Pennsylvania, 19th.
 Stateburg, South Carolina, 5th, 7th, 15th.
 San Antonio, Texas, 9th.
 Wytheville, Virginia, 14th, 26th.
 Pleasant Grove, Washington Territory, 17th.
 Tatoosh Island, Washington Territory, 22d, 25th.

POLAR BANDS.

Polar bands were reported during the month by the follow-
 ing stations:

Archer, Florida, 7th, 21st, 26th.
 Montrose, Colorado, 25th.
 Riley, Illinois, 27th.
 Guttenberg, Iowa, 5th.
 Maud, Kansas, 8th, 10th, 21st.
 Amherst, Massachusetts, 7th, 9th.
 Escanaba, Michigan, 25th.
 Moorestown, New Jersey, 5th, 7th.
 Mountainville, New York, 18th.
 Tiffin, Ohio, 9th.
 Nashville, Tennessee, 6th, 7th,
 El Paso, Texas, 28th.
 Rio Grande City, Texas, 6th, 10th, 11th, 21st, 22d.
 Dale Enterprise, Virginia, 3d.
 Wytheville, Virginia, 14th, 26th.
 Bainbridge Island, Washington Territory, 23d.
 Prairie du Chien, Wisconsin, 26th.

WATER-SPOUTS.

The bark "Ceylon," on April 10, 1885, in N. 31° 00', W.
 71° 00', was struck by a water-spout, carrying away the main
 and mizzen masts, killing the first mate and injuring the
 captain.

S. S. "Anchoria" Captain Small, on the 13th, in N. 41° 20', W.
 58° 30', saw several water-spouts. They made their appearance
 when the wind, which had been very variable all day, shifted
 suddenly to the west, and after they disappeared the weather
 immediately cleared.

S. S. "City of Chester," H. Condon, commanding, on the
 29th, when in N. 41° 30', W. 63° 30', passed a very large
 water-spout.

DROUGHT.

Los Angeles, California, 15th: the rains of the past few days
 have been of great benefit to crops which were suffering in
 consequence of drought.

Olympia, Washington Territory, 30th: the season thus far
 is considered the driest that has been known since the settle-
 ment of the country. It is reported that low, swampy places
 have become perfectly dry, that were never before known to
 be free from water.

Milledgeville, Georgia, 30th: the month has been very dry;
 on only one day, the 25th, was the soil saturated.

SAND STORMS.

Fort Yates, Dakota, 13th.
 Wilcox, Arizona, 20th.
 Wickenburg, Arizona, 26th.
 Fort Thomas, Arizona, 20th, 22d.
 Yuma, Arizona, 3d, 10th, 11th, 19th, 20th, 26th.
 Keeler, California, 20th.
 Dodge City, Kansas, 8th.
 Yutan, Nebraska, 10th.

Meteorological record of voluntary observers and army post surgeons—April, 1885.

Temperature				Temperature				Temperature				Temperature							
Station.	Mean.	Maximum.	Minimum.	Rainfall.	Station.	Mean.	Maximum.	Minimum.	Rainfall.	Station.	Mean.	Maximum.	Minimum.	Rainfall.	Station.	Mean.	Maximum.	Minimum.	Rainfall.
Fort Preble, Me.	43.0	60	25	2.45	Blackwell, N. C.	51.0	88	25	.....	Waverly, Ohio.	52.6	87	21	3.47	Genoa, Nebr.	48.7	76	19	5.32
Orono, Me.	40.8	76	20	2.34	Lincolnton, N. C.	55.6	72	39	1.45	O. S. University, Ohio.	49.0	84	17	4.51	Yutan, Nebr.	49.8	79	31	3.49
Cornish, Me.	42.7	80	23	2.93	Statesville, N. C.	60.0	87	39	1.47	Logan, Ohio.	50.7	86	20	2.31	Tecumseh, Nebr.	49.8	78	25	4.90
Gardiner, Me.	42.0	70	21	2.50	Weldon, N. C.	57.4	87	34	2.51	Marietta, Ohio.	51.2	88	23	2.69	Crete, Nebr.	49.8	78	20	4.08
Waterville, Me.	43.4	84	16	2.50	Raleigh, N. C.	60.0	90	36	1.70	McConnellsville, Ohio.	48.9	84	20	2.91	Madison, Nebr.	47.4	73	21	3.75
Charlotte, Vt.	41.9	83	20	2.90	Chapel Hill, N. C.	58.6	94	29	2.71	Pomeroy, Ohio.	53.9	84	29	3.61	Stockham, Nebr.	46.4	70	44	4.10
Burlington, Vt.	41.9	85	14	2.53	Asheville, N. C.	53.0	82	28	1.00	Granville, Ohio.	48.3	82	22	.....	Independence, Mo.	44.2	77	25	7.65
Woodstock, Vt.	41.5	80	15	1.98	Stateburg, S. C.	62.2	85	34	1.24	Lafayette, Ind.	49.2	79	23	3.72	Greenfield, Mo.	57.0	82	30	4.50
Dorset, Vt.	41.1	83	11	2.08	Aiken, S. C.	65.8	88	32	2.19	Fort Wayne, Ind.	50.0	80	28	4.11	Pierce City, Mo.	57.3	84	30	6.10
Lunenburg, Vt.	41.1	80	8	.....	Milledgeville, Ga.	63.3	87	44	1.65	Logansport, Ind.	51.2	83	24	3.74	Springfield, Mo.	56.9	81	30	5.01
Newport, Vt.	41.1	86	14	3.47	Forsyth, Ga.	65.3	85	44	1.90	Laconia, Ind.	51.2	83	31	2.93	Conception, Mo.	50.0	75	23	4.93
Post Mills, Vt.	41.2	86	16	.....	Quitman, Ga.	72.7	89	30	1.07	Sunman, Ind.	52.6	80	28	4.08	Centerville, Mo.	50.0	82	28	3.00
Stratford, Vt.	42.3	83	14	1.80	Athens, Ga.	61.3	83	30	1.07	Jeffersonville, Ind.	55.0	83	32	4.29	Carthage, Mo.	51.0	85	33	7.38
Brattleboro, Vt.	42.0	84	22	3.13	Manatee, Fla.	74.4	88	39	1.00	Guilford, Ind.	48.9	80	24	3.94	Chamols, Mo.	56.9	82	35	4.49
Amherst, Mass.	47.0	83	22	3.49	Archer, Fla.	68.0	90	47	0.27	Spiceland, Ind.	49.9	78	25	4.50	Glasgow, Mo.	50.1	80	28	5.31
Mendon, Mass.	46.5	76	30	.....	Tallahassee, Fla.	68.0	83	45	3.19	La Grange, Ind.	44.7	78	19	.....	Houstonia, Mo.	53.9	81	28	5.77
Milton, Mass.	45.1	79	30	3.17	Mayport, Fla.	69.1	88	58	0.87	Vevay, Ind.	55.0	85	30	4.69	Ironton, Mo.	57.5	82	34	2.95
New Bedford, Mass.	45.4	74	27	2.69	Limosa, Fla.	72.7	98	49	0.20	Wabash, Ind.	47.8	75	27	4.07	Macouah, Ill.	56.4	80	30	3.83
Somerset, Mass.	45.1	83	28	2.31	Fort Barrancas, Fla.	68.3	87	41	8.90	Monticello, Ind.	48.0	77	27	3.41	Kirksville, Mo.	49.9	76	24	3.34
Leicester, Mass.	43.8	79	30	2.85	Saint Augustine, Fla.	68.0	87	47	1.11	Connersville, Ind.	51.1	79	29	4.22	Lexington, Mo.	50.1	78	28	5.90
Williamstown, Mass.	44.8	81	30	3.18	Green Springs, Ala.	66.7	88	35	2.69	Franklin, Ind.	51.5	80	29	4.81	Louisiana, Mo.	51.0	76	28	6.00
Westborough, Mass.	45.0	85	35	3.52	Mt. Vernon B'ks, Ala.	69.2	91	38	8.15	Farmland, Ind.	48.0	78	24	4.08	Mexico, Mo.	50.0	75	29	5.20
Fall River, Mass.	44.8	80	25	2.70	Birmingham, Ala.	65.3	88	34	.....	Terre Haute, Ind.	51.0	78	31	4.61	Miami, Mo.	54.0	82	28	7.25
Princeton, Mass.	43.3	79	21	2.93	Greensboro, Ala.	65.7	83	40	3.17	Mauzy, Ind.	53.1	78	20	4.25	Oregon, Mo.	51.7	78	25	5.77
Rowe, Mass.	41.3	79	16	3.13	Point Pleasant, La.	65.6	82	46	19.58	Knightstown, Ind.	50.1	80	20	2.66	Pleasant Hill, Mo.	50.0	76	32	10.05
Taunton, Mass.	47.0	84	27	2.61	Luling, La.	69.0	73	49	5.31	Richmond, Ind.	50.4	77	25	3.27	Steelville, Mo.	50.0	78	25	2.53
Readville, Mass.	44.3	79	24	2.91	Grand Coteau, La.	71.5	86	50	4.44	Columbus, Ind.	53.4	81	30	4.52	Sedalia, Mo.	52.7	84	27	5.09
Worcester, Mass.	44.5	78	23	2.83	New Ulm, Tex.	69.3	78	60	5.73	Marengo, Ind.	50.9	81	34	8.30	Sherrill, Mo.	57.5	83	32	3.68
Deerfield, Mass.	45.0	83	23	3.40	Olbourne, Tex.	65.0	88	42	6.41	Blue Lick, Ind.	55.4	80	28	4.04	Pro Tem, Mo.	52.2	87	33	5.38
Providence, R. I.	40.1	83	23	2.67	Fort Brown, Tex.	75.6	87	57	0.80	Huntingburg, Ind.	55.0	78	31	3.85	Atchison, Kans.	52.6	77	30	5.30
Nayatt Point, R. I.	40.1	82	31	1.65	Huntsville, Tex.	75.6	87	57	0.80	Princeton, Ind.	53.6	80	28	3.70	Independence, Kans.	56.5	83	31	5.12
Hartford, Conn.	46.8	86	34	3.08	Austin, Tex.	70.8	83	36	4.71	Worthington, Ind.	54.2	81	30	4.94	Yates Centre, Kans.	54.7	78	31	5.33
Southington, Conn.	40.7	87	25	1.92	Mount Ida, Ark.	63.0	80	32	8.00	Noblesville, Ind.	51.3	78	30	4.30	Wyandotte, Kans.	52.8	74	30	6.00
North Colebrook, Conn.	41.8	80	18	5.18	Lead Hill, Ark.	62.3	87	33	5.38	Degonia Springs, Ind.	55.6	83	31	2.79	Salina, Kans.	55.4	85	28	7.03
Voluntown, Conn.	47.6	86	26	2.35	Helvetia, V. Va.	47.3	84	10	5.04	Greenfield, Ind.	49.2	70	30	.....	Emporia, Kans.	54.2	78	31	5.70
Mountainville, N. Y.	47.6	86	24	2.30	Austin, Tenn.	60.2	84	35	2.55	Salem, Ind.	54.0	78	32	4.26	Westmoreland, Kans.	51.0	79	26	7.01
Humphrey, N. Y.	39.2	78	14	2.86	Ashwood, Tenn.	60.8	81	34	3.60	Brookville, Ind.	50.2	79	28	.....	Clay Centre, Kans.	54.8	80	30	5.90
Palermo, N. Y.	38.0	84	10	1.00	Greenville, Tenn.	57.0	85	28	1.80	Mattoon, Ill.	49.0	79	29	6.20	Fort Scott, Kans.	57.3	83	32	7.73
Port Jervis, N. Y.	44.6	84	29	1.88	Maryville, Tenn.	59.0	82	36	1.91	Bunker Hill, Ill.	52.8	81	24	4.27	W. Leavenworth, Kans.	52.5	77	28	8.90
Auburn, N. Y.	43.3	82	20	2.61	Andersonville, Tenn.	58.0	84	24	2.14	Collinsville, Ill.	54.8	78	28	4.32	Maud, Kans.	58.2	84	36	7.50
Menand, N. Y.	45.5	83	26	3.05	Careyville, Tenn.	58.0	81	31	2.59	South Evanston, Ill.	43.0	78	21	3.32	Wellington, Kans.	54.5	85	29	4.84
Ithaca, N. Y.	41.6	86	18	1.73	Sweetwater, Tenn.	59.0	82	33	5.58	Sycamore, Ill.	42.6	73	25	4.31	Allison, Kans.	53.0	82	30	2.22
Le Roy, N. Y.	43.5	87	21	3.20	Parksville, Tenn.	58.0	81	28	1.92	Sandwich, Ill.	46.7	78	26	2.46	Oswego, Kans.	50.0	83	30	8.32
Cooperstown, N. Y.	40.3	82	15	1.94	Sunbright, Tenn.	58.0	84	33	5.28	Wilton Centre, Ill.	44.8	80	19	3.37	Manhattan, Kans.	52.9	74	26	4.95
North Volney, N. Y.	39.2	87	19	2.40	Grief, Tenn.	57.0	84	34	1.95	Charleston, Ill.	54.3	79	22	4.74	Shellock, Kans.	55.3	80	35	2.74
Factoryville, N. Y.	42.0	86	22	1.51	Festoria, Tenn.	55.0	78	21	2.15	Peoria, Ill.	51.7	79	30	4.44	Sterling, Kans.	54.1	83	28	10.80
White Plains, N. Y.	48.6	78	28	6.63	Cookville, Tenn.	59.0	81	34	2.33	Swanwick, Ill.	54.8	78	30	2.91	Wentworth, Dak.	44.2	73	18	3.71
Fort Niagara, N. Y.	39.0	78	18	1.62	McMinnville, Tenn.	57.0	80	35	.....	Anna, Ill.	58.5	81	33	2.69	Richardton, Dak.	39.9	70	26	3.30
Fort Columbus, N. Y.	47.5	79	27	2.11	Manchester, Tenn.	57.0	80	29	3.37	Rockford, Ill.	43.7	74	25	4.33	Medora, Dak.	44.5	70	22	.....
Madison Barracks, N. Y.	48.8	77	16	1.48	Riddletown, Tenn.	59.0	84	30	4.56	Hiley, Ill.	42.2	74	23	3.57	Fort Yates, Dak.	45.0	76	20	1.92
Plattsburg Barracks, N. Y.	40.1	82	14	1.39	Beech Grove, Tenn.	58.0	82	34	3.18	Fort Brady, Mich.	35.4	70	5	0.53	Fort Totten, Dak.	39.5	74	5	3.21
Fort Hamilton, N. Y.	42.0	78	22	2.00	Flat Creek, Tenn.	60.0	80	30	3.77	Hudson, Mich.	42.3	82	17	2.30	Fort Sisseton, Dak.	41.9	99	11	1.83
David's Island, N. Y.	46.5	79	21	1.39	Florence Station, Tenn.	60.0	80	36	2.40	Bozette, Mich.	37.6	82	0	2.67	Fort Sully, Dak.	49.0	81	23	1.53
Somerville, N. J.	49.1	87	31	1.25	Howell, Tenn.	60.0	81	37	2.60	Manistique, Mich.	35.6	83	6	2.19	Fort Randall, Dak.	50.1	81	18	1.79
Vineland, N. J.	51.8	84	27	2.07	Hardison's Mills, Tenn.	59.0	80	35	2.69	Moorestown, Mich.	37.1	78	9	2.50	Fort Pembina, Dak.	47.2	68	12	5.90
Moorestown, N. J.	49.1	85	27	2.82	Hurricane Switch, Tenn.	59.0	80	33	3.47	Ann Arbor, Mich.	42.6	80	19	3.47	Fort A. Lincoln, Dak.	42.8	74	16	4.00
Dover, N. J.	46.5	87	26	1.03	Pulaski, Tenn.	61.0	87	36	3.52	Birmingham, Mich.	42.6	80	19	2.91	Fort Menden, Dak.	40.4	78	25	1.30
Princeton, N. J.	49.1	85	26	1.57	Kingston Springs, Tenn.	58.0	83	27	4.00	Ionia, Mich.	43.9	82	19	2.04					

The only stations reporting the April, 1885, precipitation, less than the average for the month during the period for which records have been made, are as follows: Davenport, 0.49 less; McLeansboro, 0.59; Anna, 1.41; and Cairo, 2.72.

The total precipitation during the past eight years for the months of January, February, March, and April, is given in the following table:

Month.	Year.							
	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
January	1.46	1.61	3.86	1.49	2.41	1.87	1.31	2.81
February	2.37	1.64	2.71	4.68	4.80	6.55	4.03	1.29
March	2.69	2.26	3.78	3.89	4.47	1.03	2.81	0.51
April	4.15	2.02	3.79	2.49	3.75	4.17	2.81	4.11
Total	10.61	7.53	12.64	12.55	15.43	14.22	10.86	8.72

The precipitation, the past eight years, in January, February, March, and April has averaged 11.57 inches. The precipitation during the first four months of the current year is twenty-five per cent. less than the precipitation for the corresponding months in the years included in the above table.

Meteorology.—The science of meteorology is deservedly receiving more attention each succeeding year, especially at the hands of the more intelligent farmers who realize the great practical value of information of this character to all engaged in agricultural pursuits.

New observers.—The department desires to secure the assistance of an observer for each county in the state. There are doubtless parties in the counties not represented in this report by observers, that are giving attention to the science of meteorology. The attention of all interested in having the meteorological history of each county in the state preserved in the Monthly Weather Review of the Department, is invited to the importance of this work and an earnest invitation is extended to all to aid in completing the meteorological records of the state.

CHARLES F. MILLS, *Secretary.*

The following meteorological summary and accompanying remarks are from the April, 1885, report of the "Indiana Volunteer Weather Service," under direction of Professor W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Monthly mean.	
Northern counties.....	83	20	47.6	3.64
Central counties.....	81	20	50.2	4.40
Southern counties.....	85	24	54.3	4.14
State.....	85	20	50.7	4.09

Roughly speaking, and as shown by the 7 a. m. Signal Service Weather Map, the weather conditions of the state were dominated by a high barometer on the 1st, 4th, 9th, 13th, 14th, 19th, 20th, 21st, 24th, 26th, 29th, and by a low on the 7th, 11th, 15th, 16th, 17th, 27th, 28th, 30th. On the 2d, 3d, 5th, 6th, 8th, 10th, 12th, 18th, 22d, 23d, 25th, the barometer was near the normal height, and neither cyclonic or anti-cyclonic forces were present in important degree. Rains occurred in all sections on the 2d, 3d, 7th, 8th, 10th, 11th, 12th, 14th, 15th, 16th, 17th, 18th, 23d, 24th, 25th, 28th, 30th, and at one or more stations on the 1st, 4th, 5th, 6th, 19th, 22d, 26th, mostly very light. Snow occurred in all sections on the 12th, 13th, 14th, and at one or more stations on the 3d, 6th, 8th, 9th, 11th, 15th, 28th. Thunder-storms occurred in all sections on the 17th, 25th, 30th, and at one or more stations on the 2d, 5th, 7th, 8th, 15th, 16th, 28th. Frost occurred in all sections on the 4th, 29th, and at one or more stations on the 1st, 3d, 9th, 10th, 12th, 13th, 14th, 25th, 27th, 28th. The heaviest and most general rains fell on the 14th, 15th, 16th, 30th, attending the cyclones of the 15th, 30th. The first of these storms originated on the 14th, in Colorado, moved slowly eastward, and apparently disappeared in Illinois on the 17th; the last originated on the 29th, in Colorado, and was central in Missouri on the 30th. The rains and thunder-storms of the 25th attended a low barometer, central in Minnesota that morning.

The lowest temperatures of the month occurred at most stations on the 4th, in connection with a high barometer, central that morning in Arkansas and eastward, and the highest on the 22d in connection with a low barometer central that morning west of Lake Superior. The highest barometer, the morning of the 22d, was over the South Atlantic States. This arrangement of cyclonic and anti-cyclonic forces would seem favorable for forcing bodies of warm air from the south over this section.

There was a slight predominance of high barometer weather and a slight deficiency in temperature to agree with it.

No cyclone of great force affected the weather during the month, but storms of no great energy or persistence were quite numerous, which will account for the excess of about one inch in the average rainfall. The rainfall was remarkably evenly distributed. Our comparative table is arranged to show at a glance the relation of this month's temperature and precipitation to the same for past years, and to the averages for many years at some stations. Compared with this year, the temperature for 1883 was 1° 4 higher; 1884, 0° 7 lower; normal at Indianapolis, 1° 8 higher; at Logansport, 2° 5 higher; at Spiceland, 0° 5 higher; at Vevay, 4° 2 higher.

Vegetation is from two weeks to a month behind time, as a result of the

persistent deficiency in temperature. Total wind velocity: Greencastle, 6,949 miles; Indianapolis, 5,209 miles; Lafayette, 7,168 miles.

The following meteorological summary and accompanying notes are from the April, 1885, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
Northern counties.....	83.0	24.0	48.26	3.49
Central counties.....	81.0	20.0	50.36	4.22
Southern counties.....	85.0	26.0	54.33	4.52
State.....	85.0	20.0	50.95	4.08

The mean temperature for the state, 50° 98, is about 1° 5 below the normal and 2° above that for April, 1884; the highest temperature, 85°, is reported from Vevay, on the 22d; the lowest, 20°, is reported from Knightstown, on the 13th.

The mean rainfall for the state, 4.08 inches, is 1.37 above the average for April, 1884, and is about 0.50 above the April normal.

A severe thunder storm accompanied by heavy rain, and in some places hail, passed over the central and southern counties on the 17th. At Vevay, 0.85 inches of rain fell in forty minutes, and the rapid rise in the streams did considerable damage to mill property. At Spiceland two houses were damaged.

A severe frost is reported from all parts of the state on the 29th.

The following is an extract from the April, 1885, report of the "Minnesota Weather Service," under direction of Prof. W. W. Payne, of Carleton College, Northfield:

Temperature.—The temperature of the month of April in Minnesota has varied but slightly from the normal in the central and southern parts of the state. Duluth reports a monthly mean of 36° 8, 1° 3 below the average of fifteen years, while Moorhead reports the monthly mean as 40° 7, 2° 3 above the average for the last five years.

The temperature, with the exception of the 4th and 5th, remained rather low from the 1st to the 14th, and vegetation previous to that date had made but little progress. After the 14th there was a marked increase of temperature, which, with the exception of the 27th, continued until the end of the month.

Precipitation.—There was a decided excess of rainfall in the Red River valley in the northwestern and also in the southeastern part of the state; 3.43 inches was measured at Moorhead, an excess of 1.68 inches; 3.19 inches at Saint Paul, an excess of 1.18 inches; and 0.89 inches at Duluth, a large deficiency. The central, western, and southwestern parts of the state had about an average precipitation, Park Rapids reporting 2.32; Wadena, 1.75; Bird Island, 2.60; and Albert Lea, 2.56 inches.

The 6th, 7th, 10th, 11th, 19th, 20th, 21st, 25th, and 27th, were the dates of greatest rainfall, and the principal amount occurred during the last half of the month. An exception to this is Moorhead, where 1.55 inches was measured on the 6th.

Precipitations of over .50 inch in one day were observed at the following points: Moorhead, 1.55 on the 6th, .50 on the 19th, .83 on the 20th; Park Rapids, 1.06 on the 20th; Wadena, 1.33 on the 20th; Saint Paul, .68 on the 21st, and 1.36 on the 26th; Bird Island, .51 on the 20th, .78 on the 21st, and .92 on the 27th; Red Wing, 1.57 on the 27th; Albert Lea, .50 on the 6th, and .53 on the 21st; Northfield, .72 on the 21st, and 1.30 on the 27th.

The following is the April, 1885, report of the "Missouri Weather Service," under the direction of Prof. Francis E. Nipher, Saint Louis:

The mean temperature of the past month has been half a degree above the normal for April. The coldest temperature reached was 32° 8, on the 8th. The average minimum was 49°, so that the month has been unusually free from cool weather. In forty-eight years the minimum in April has at some time fallen to or below 32° on every day of the month up to the 20th, and also on the 22d, 23d, and 30th. The maximum temperature was 78°. In the last forty-eight years the April temperature has been above 80° on every day of the month, the highest maximum ever observed in April being 99°, on April 18, 1855. In the state the lowest minimum observed was 23°, at Savannah, and 24° at Kirksville. The highest maximum was 84°, at Sedalia.

The rainfall at the central station was 4.28 inches, which is 0.58 in excess of the normal rainfall, but which is often exceeded. The April rainfall in 1884 was 7.60 at Saint Louis. In the state the fall has varied greatly, being less than 1.5 inches in the southeast part of the state and rising to 10 inches in the central western parts.

On the night of the 29th and 30th high winds, probably a tornado, occurred five miles southwest of Pleasant Hill; cars were blown off the track, houses unroofed, and great damage was done to property.

Spring work has been delayed somewhat in the western part of the state by the heavy rains.

Reports of the wheat crop are no more encouraging than last month.

In the extreme southern part of the state the prospect for a peach crop is reported as excellent.

The following is an extract from the April, 1885, report of the "Nebraska Weather Service" under direction of Professor Goodwin D. Swezey, of Doane College, Crete:

The month of April, 1885, has not been a marked month. The mean temperature has been $49^{\circ}2$, which is $1^{\circ}3$ below normal April temperature for the state, which is $50^{\circ}5$.

The noon temperature for the state, $58^{\circ}2$, is in like manner slightly less, viz., $1^{\circ}2$ below the normal noon temperature for April, which is $59^{\circ}4$.

The number of rainy days throughout the state has averaged about ten, the usual number for April being seven; and the amount of precipitation has been in about the same proportion, viz., 4.29 inches instead of the normal, 3.08. The proportion of cloudy days, however, has been less instead of more.

The wind record for the month has been less than any preceding April for several years. No severe storms have occurred. The month opened with a storm central in northern Texas on the night of the 1st, but this passed eastward, causing severe gales on the Atlantic coast on the 4th. In Nebraska the storm was not severe and the rain mostly inappreciable, although accompanied by thunder and lightning.

A second storm swept the country a week later, bringing rain in Nebraska on the 6th, together with a rise of temperature to the highest for the month, passing as a severe storm north of the lake region and causing general rains to the east of us on the 7th and 8th.

This was followed by a cold wave which gave the lowest temperature of the month at the central station, $17^{\circ}8$, on the 8th; this wave passing eastward caused frosts even in the south Atlantic and Gulf states.

The heaviest rainfall of the month came on the 20th and 21st, accompanied by another rise of temperature to nearly the same point as on the 6th; this was the wave which, passing eastward, gave the highest temperature of the month in the states farther east. At the central station the greatest velocity of wind for the month came with this storm.

Rain fell generally in eastern Nebraska on the 24th and 25th, and again on the closing days of the month; both these storms were followed by gales on the lakes and Atlantic coast, where wind velocities ranged from 59 to 64 miles an hour on the 29th.

This record of the progress of our storms, as traced by the observers of our own weather service and those of the Signal Service in other parts of the country, is instructive as showing how generally our storms originate in the western states and territories and progress steadily eastward.

The average of rain and melted snow, chiefly the former, for the different sections of the state for April, 1885, is as follows: N. E. section, 4.54 inches; S. E. section, 4.37; N. W. section, 3.63; S. W. section, 5.05.

The following is an extract from the April, 1885, bulletin of the "New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, R. I.:

The general discussion of the meteorological conditions for the month is based upon reports from one hundred and eight observers, a summary of whose observations is given in Table II, and upon the current publications of the United States Signal Service.

General Conditions.—The first half of month was characterized by usual April conditions, fair weather alternated by light rains, or by snows in the northern portion. The extreme cold of February and March was followed by mild temperature, though still below the average for the early part of April. After the 15th, a period of dry, very warm weather prevailed for ten days, broken at a few places in New Hampshire and Vermont by slight showers. In the last five days two storms of severity closed this period of drought. The frost of the winter had penetrated into the ground to an unusual depth, and at the close of the month was not wholly out of the ground. Thus, at Woonsocket, Rhode Island, on the 14th, the ground was free from frost for a depth of three feet, below which was two feet of unusually hard frozen earth. On the 28th frost two feet thick was found beginning at a depth eighteen inches below the surface.

Precipitation.—As shown in Table I, the amount for the month shows a deficiency, if we average the records at the several stations. The deficiency was greatest at the southern stations, except at Mount Washington, where the maximum deficiency is noted, while at northern stations an excess occurred. In the extreme eastern portion the excess was large, due especially to the great rainfall in the storm of the 29th. The form was almost wholly rain, the amount of snow recorded having been much less than the average for April.

Temperature.—The mean temperature for the month was above the average at nearly all the stations, as shown by Table I. But this does not express the real character of the month; for the first half was cold, and the excess in the final average is due to the exceptionally high temperature which prevailed from the 20th to the 25th. It will be seen by reference to Table II that temperatures above 80° were noted at a majority of stations. The range of temperature was large, as shown by the map.

Storms.—The precipitation of the month occurred in connection with the movements of the five barometric depressions, which may be briefly traced

as follows: the first from the southwest to Maine, 4th and 5th, developing into a violent storm as it passed beyond the country; the second and third, from the lakes down the Saint Lawrence, 7-9th and 11-13th, respectively—both light storms; the fourth, from the southwest to Maine, 26-28th; the fifth, from the lower lakes eastward over southern New England, 28-30th. The last-named storm increased in energy very rapidly, the pressure falling to 29.2 , and the winds attaining great velocity, as noted below. The passage of the fourth and fifth depressions was marked by thunder and lightning. The times of the beginning of these thunder-storms at those stations for which they have been reported are of interest. They are: 26th. Pawtucket and Providence, Rhode Island, 4.45 p. m.; Taunton, Massachusetts, 5.08 p. m.; Provincetown, Massachusetts, 5.30 p. m. 28th. Setauket, New York, 4.45 p. m.; Fitchburg, Massachusetts, 6 p. m.; Manchester, New Hampshire, 10 p. m.; Taunton, Massachusetts, 11 p. m.

Wind.—The wind velocities in connection with the fifth depression were great; among those reported are: Block Island, Rhode Island, forty-four miles per hour; New York City, forty-six; Boston, Massachusetts, fifty; Blue Hill, Massachusetts, fifty-seven. At Eastport, Maine, a velocity of forty-eight miles per hour was recorded on the 4th. The highest velocity reached at the summit of Mount Washington was ninety-six miles, on the 27th. The total wind movement of the month was, at Mount Washington, 25,070; Blue Hill, 15,163; Boston, 9,323 miles.

Advance of Spring.—With the month of April spring fairly opened. The severity of the winter may be shown from the record, at Gardiner, Maine, that the Kennebec river was closed to navigation one hundred and twenty-three days (the largest record is one hundred and forty-two days); sleighing was good on ninety-five days, and the snowfall, eighty-eight inches, is slightly above the average. At the close of April, the season is estimated to be from one to three weeks later than usual.

The following meteorological summary for April, 1885, is compiled from the advance report of the "Ohio Meteorological Bureau," under direction of Professor T. C. Mendenhall:

Temperature.

Mean for state (determined from observations at thirty-four stations), $48^{\circ}4$; highest monthly mean, $53^{\circ}9$, at Ironton, Lawrence county; lowest monthly mean, $42^{\circ}8$, at Jefferson, Ashtabula county; maximum for state, 92° , at Portsmouth, Scioto county, on the 23d; minimum for state, 10° , at Jefferson, on the 14th; range for the state, 82° ; station reporting greatest monthly range, Jefferson, 74° ; stations reporting least monthly range, Lebanon, Warren county, and Wapakoneta, Auglaize county, 54° ; station reporting greatest daily range, Portsmouth, 50° , on the 2d; station reporting least daily range, McConnellsville, Morgan county, 3° , on the 13th.

Precipitation.

Average (determined from observations at forty-four stations), 3.12 inches; station reporting largest monthly, Oberlin, Lorain county, 5.26; station reporting least monthly, Warren, Trumbull county, 1.53 inches; largest daily precipitation is reported from Oberlin on the 16th, 3.00 inches.

Average number of clear days, 7.2; fair days, 11.4; cloudy days, 11.2; rainy days, 13.

Of thirty-two stations reporting prevailing winds, nine show the prevailing direction from northwest; six from south and west; five from northwest and southeast; one from north, while none were reported from northeast or east.

The following is an extract from the April, 1885, report of the "Tennessee Weather Service," under direction of Hon. A. J. McWhirter, Nashville:

The small amount of precipitation, the low temperature during the first half of the month, and high winds were some of the special characteristics of April.

The mean temperature was $59^{\circ}34$, $3^{\circ}77$ above the April mean of last year, and $16^{\circ}77$ above the mean of last March. The mean of maximum temperatures was $82^{\circ}63$, and the mean of minimum temperatures was $30^{\circ}16$, respectively 3° above, and $1^{\circ}91$ below those of April, 1884. The highest temperature was recorded about the 22d and 23d, and the lowest about the 4th and 14th.

The average precipitation was 2.75 inches, 2.20 inches less than that for April of last year, and only .41 inch greater than that for March, which was remarkably small. The fall was pretty evenly distributed, the Eastern division receiving an average of 2.29 inches, the Middle division 3.03 inches, and the Western division 2.94 inches. The greatest rainfall was 6.15 inches, reported at Dyersburg, which station reports also the greatest daily rainfall, 3.82 inches, on the 17th. The days of the greatest rainfalls were the 3d, 7th, 8th, 16th, 17th, 24th, 25th, 28th, and 30th. The first named five were general rains, the 17th showing the greatest amount for one day. There were only three days entirely free from precipitation, the 19th, 20th, and 21st. There was a very slight fall of snow reported, on the 13th, at three stations in the Eastern division.

Frosts were reported as follows: Greeneville, 9th; Andersonville, 5th, 9th, 24th; Careyville, 12th; Sweetwater, 14th (with ice); Parkville, 14th; Grief, 13th, 14th, latter damaging peaches; Sunbright, 5th, 9th, 10th, 14th; Farmingdale, 5th, 10th, 14th; Chattanooga, 5th, 9th, 10th, 13th, 14th; Cookeville, 5th, 9th, 10th, 12th, 14th; Manchester, 1st, 5th, 9th, 10th, 14th; Beech Grove, 5th, 10th (with ice); Riddleton, 4th, 5th, 10th; Austin, 5th, 9th, 13th, 14th.

(last with ice); Florence Station, 13th; Howell, 5th, 10th, 14th; Nashville, 5th, 9th; Hardison's Mills, 1st, 9th, 10th, 12th, 14th; Ashwood, 5th, 9th, 10th, 13th; Hurricane Switch, 5th, 9th, 10th, 14th; Pulaski, 14th; Hohenwald, 5th, 9th, 10th, 12th; McKenzie, 4th, 5th, 10th; Milan, 10th; Trenton, 5th, 10th; Bolivar, 4th, 11th, 12th, 13th; Dyersburg, 4th, 5th, 10th; Somerville, 4th, 10th; Covington, 4th, 5th; Woodstock, 4th (with ice), 10th.

State summary.

Mean temperature, $59^{\circ}.34$; highest temperature, 89° , on the 24th, at Flat Creek; lowest temperature, 21° , on the 14th, at Fostoria; range of temperature, 68° ; mean monthly range of temperature, $49^{\circ}.92$; greatest monthly range of temperature, 60° at Andersonville; least monthly range of temperature, 42° at Paris; mean daily range of temperature, $17^{\circ}.27$; greatest daily range of temperature, 49° , on the 5th, at Kingston Springs; least daily range of temperature, 2° , on the 3d, at Greeneville and McKenzie, on the 5th at Waynesboro, on the 16th at Maryville, on the 17th at Andersonville, on the 24th at Florence Station, and on the 25th at Manchester; mean of maximum temperatures, $82^{\circ}.63$; mean of minimum temperatures, $30^{\circ}.16$.

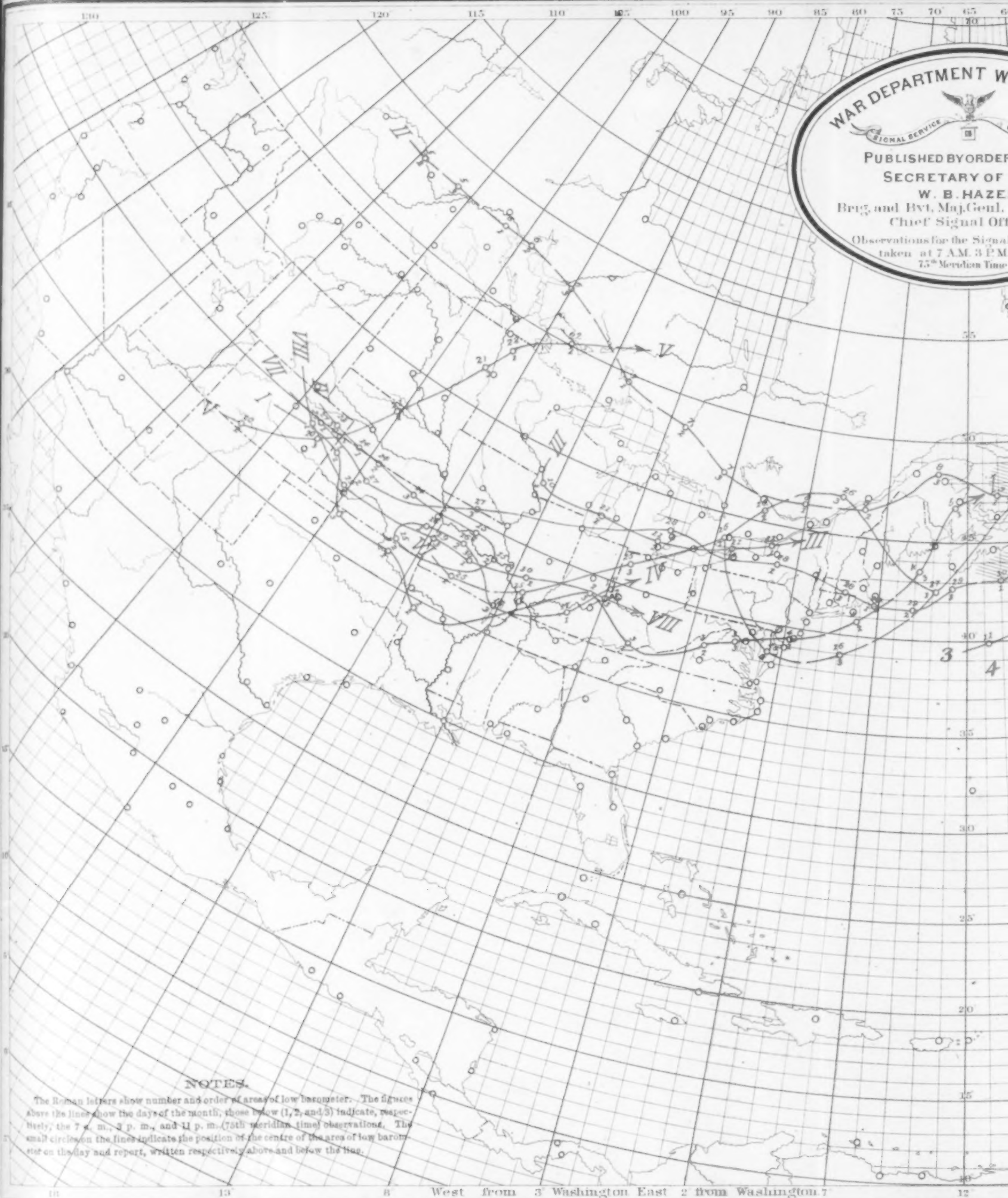
Mean depth of rainfall, 2.75 inches; mean daily rainfall, .092 inch; greatest rainfall, 6.15 inches at Dyersburg; least rainfall, 1.60 inches at Chattanooga; greatest local daily rainfall, 3.82 inches, on the 17th, at Dyersburg; days of greatest rainfall, 3d, 7th, 8th, 16th, 17th, 24th, 25th, 28th, 30th; day of greatest rainfall, 17th.

Average number of days on which rain or snow fell, 8.9; average number of clear days, 10; average number of fair days, 10.4; average number of cloudy days, 9.6; rainless days, 19th, 20th, 21st; coldest days, 4th, 14th; warmest day, 23d.

Prevailing direction of wind, south.

ERRATUM.

In the March REVIEW, page 64, under "deviations from mean temperature," Moorestown, Burlington county, New Jersey, should read: mean temperature $29^{\circ}.7$, is $8^{\circ}.5$ below the March average, etc.

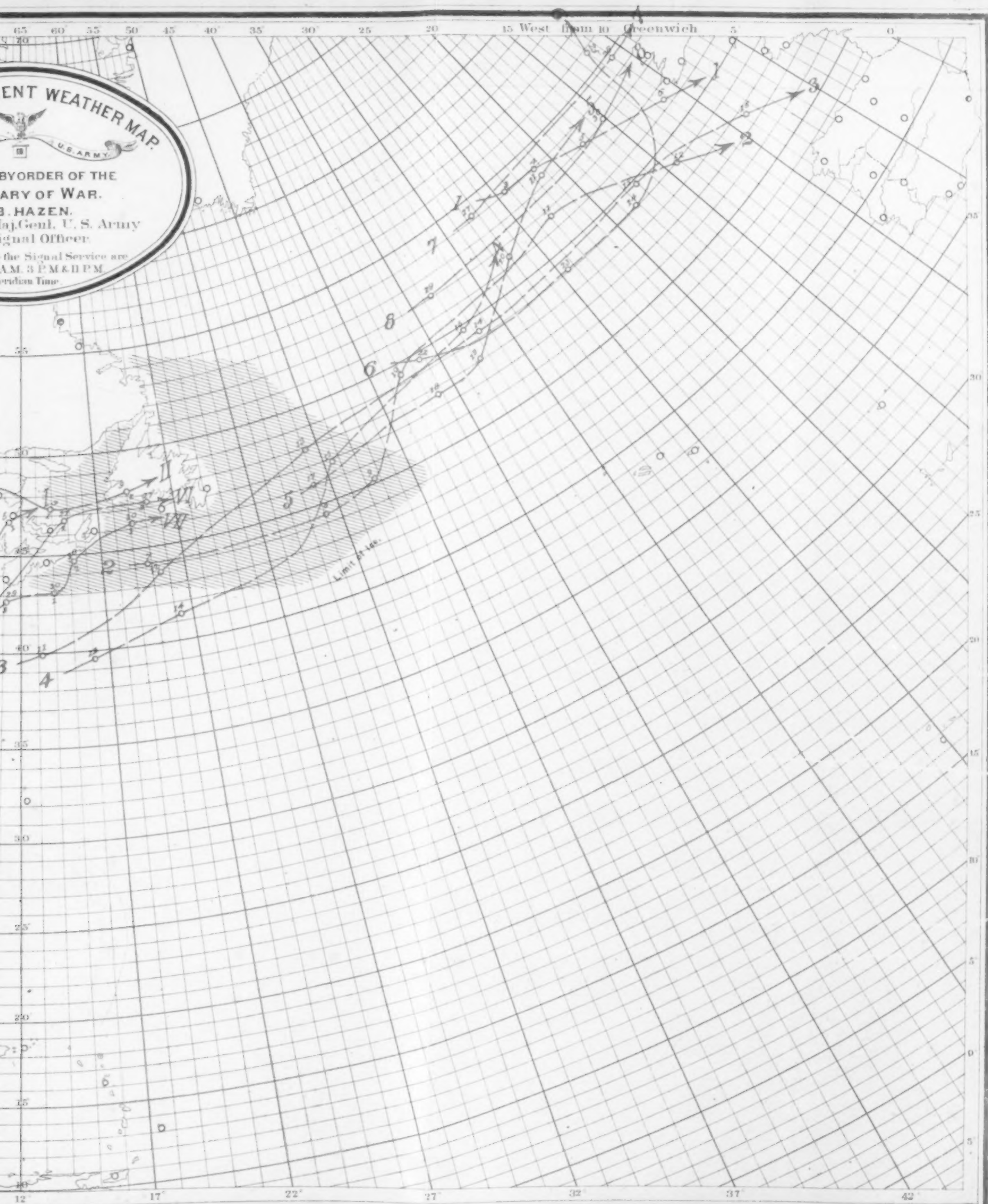


WAR DEPARTMENT
SIGNAL SERVICE
PUBLISHED BY ORDER
SECRETARY OF
W. B. HAZE
Brig and Bvt. Maj. Genl.
Chief Signal Off.
Observations for the Signal
taken at 7 A.M. 3 P.M.
11 P.M. 75th Meridian Time

NOTES.

The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below (1, 2, and 3) indicate, respectively, the 7 a. m., 3 p. m., and 11 p. m. (75th meridian time) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

Barometer Areas. April, 1885



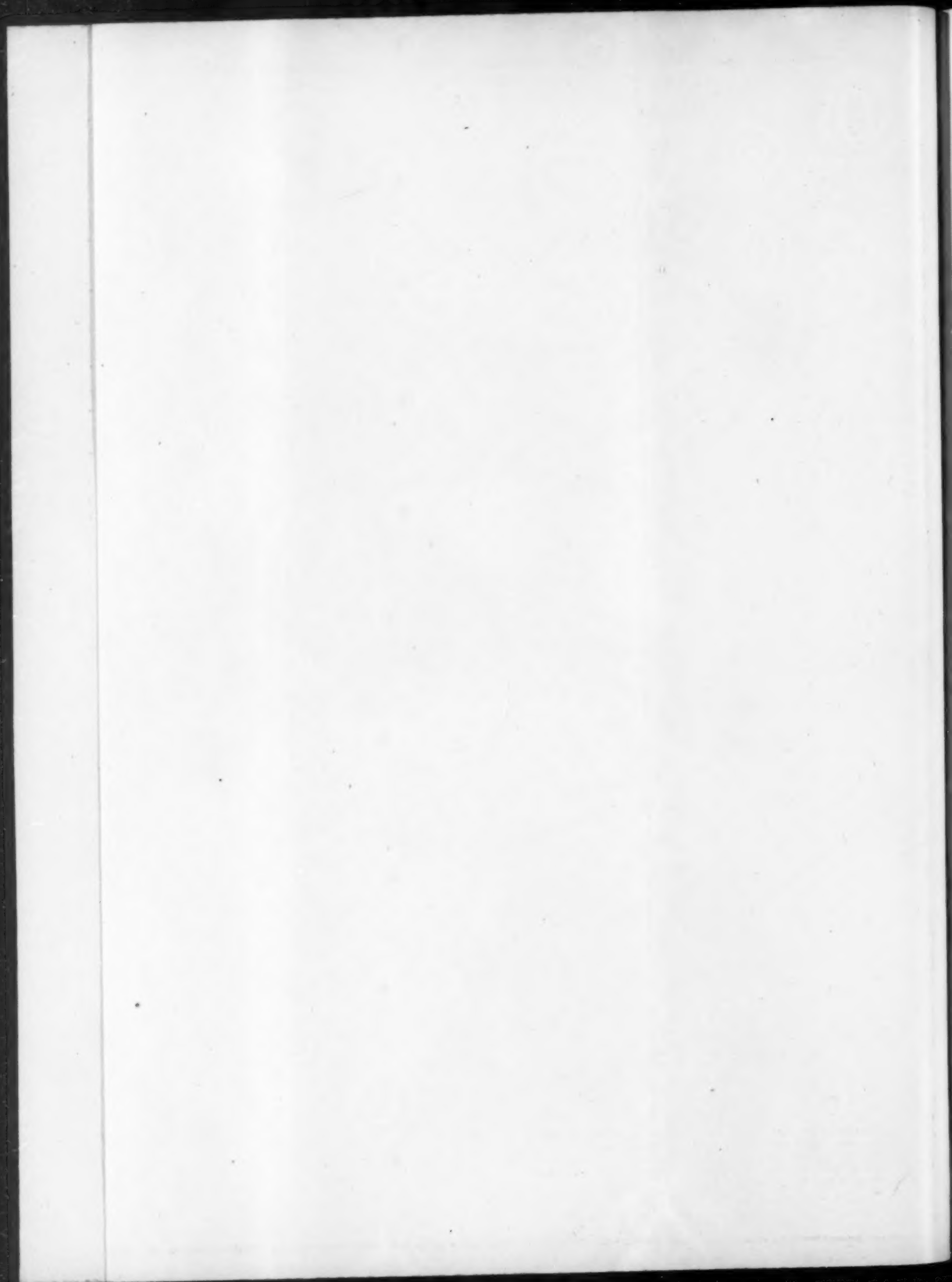
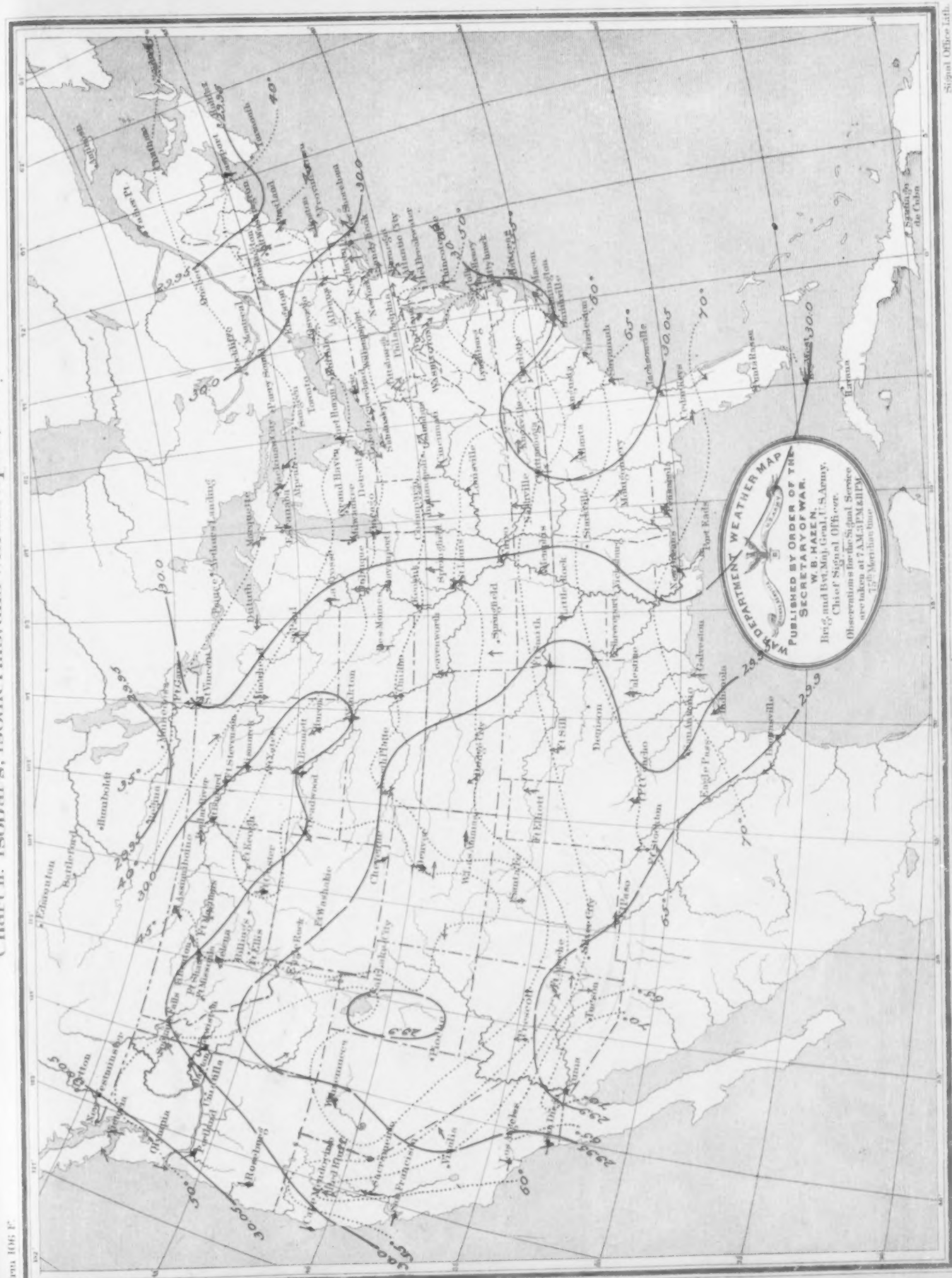


Chart II. Isobars, Isotherms, and Winds, April, 1885

Form 106 F.



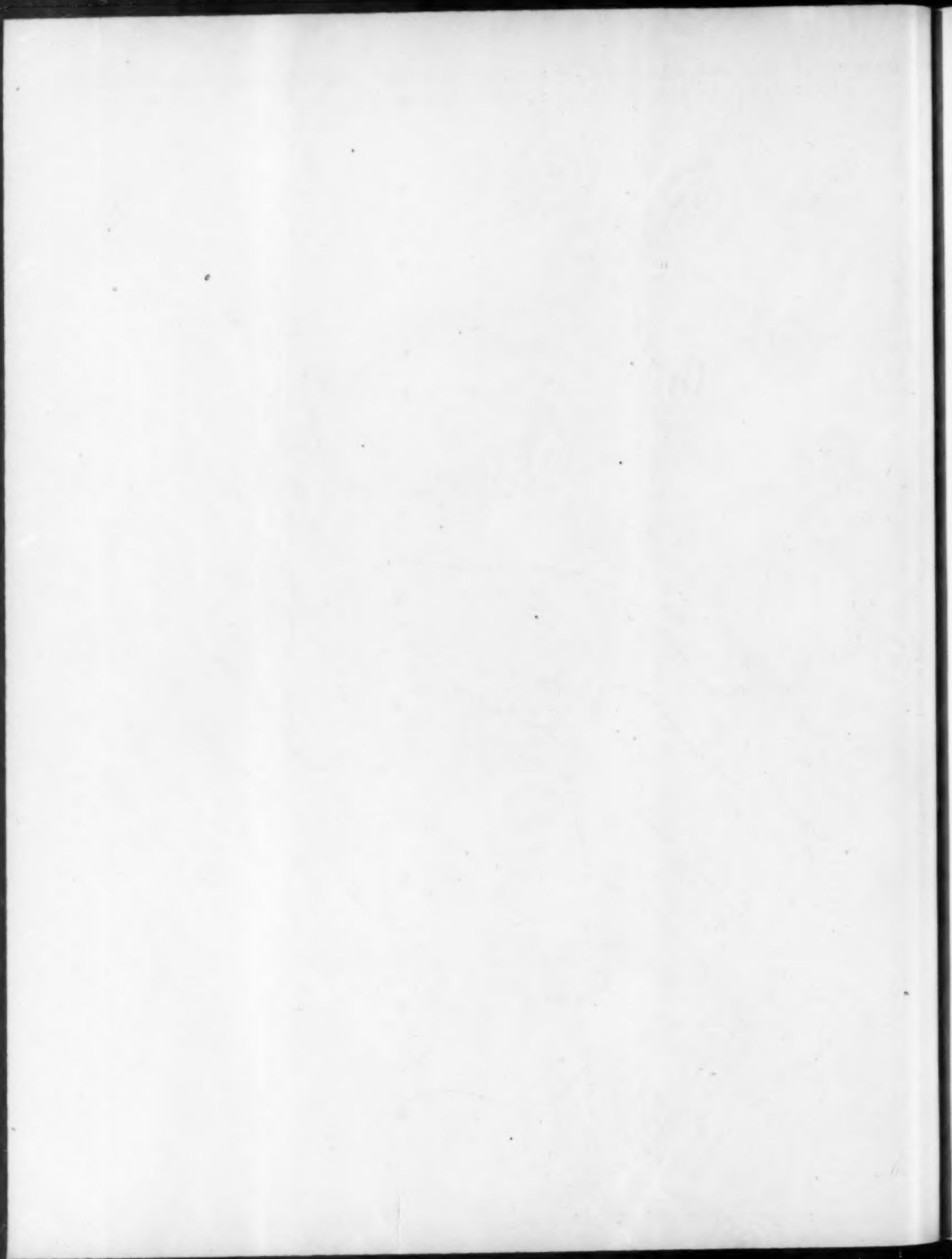


Chart III. Precipitation, April, 1885

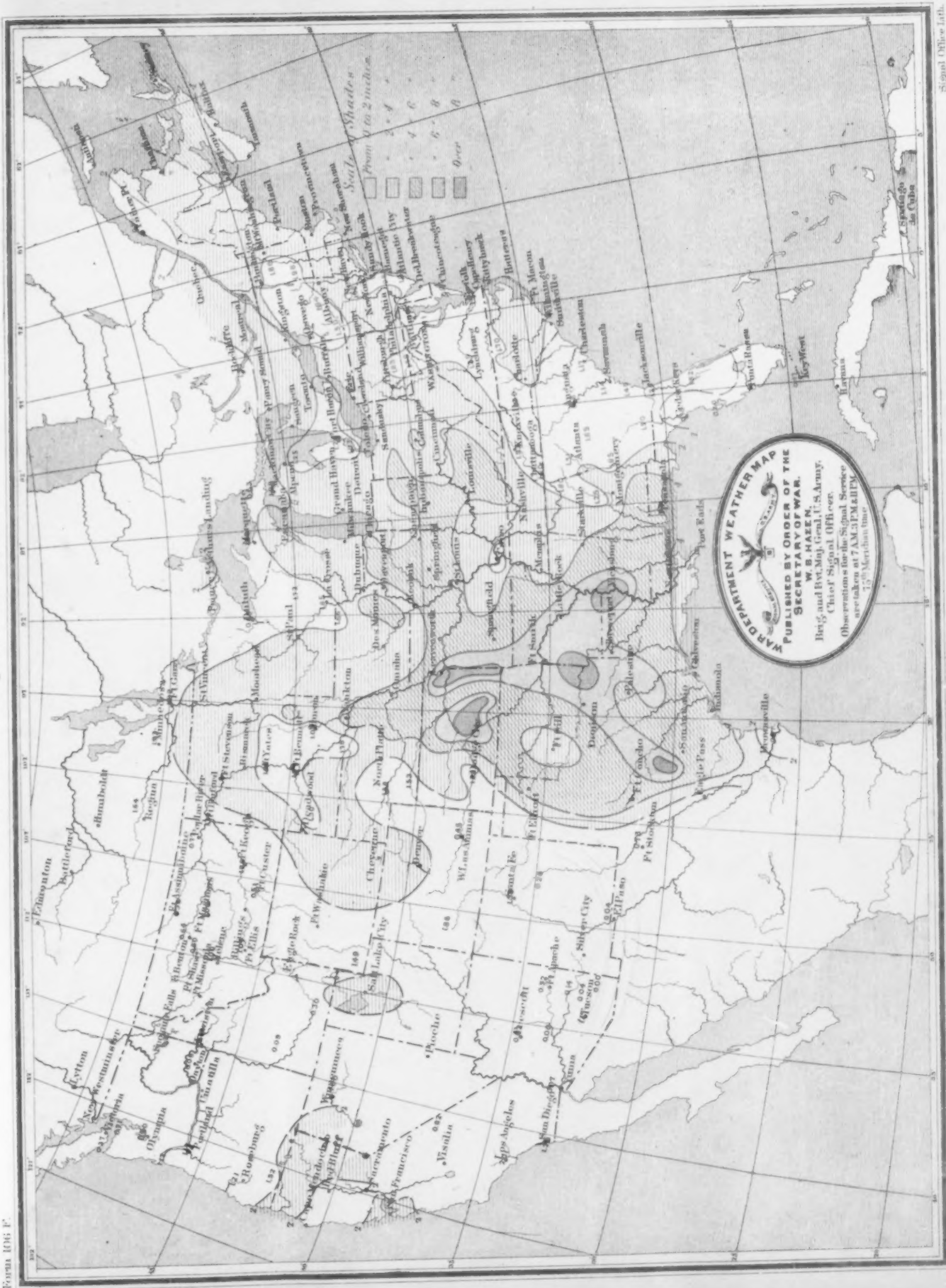
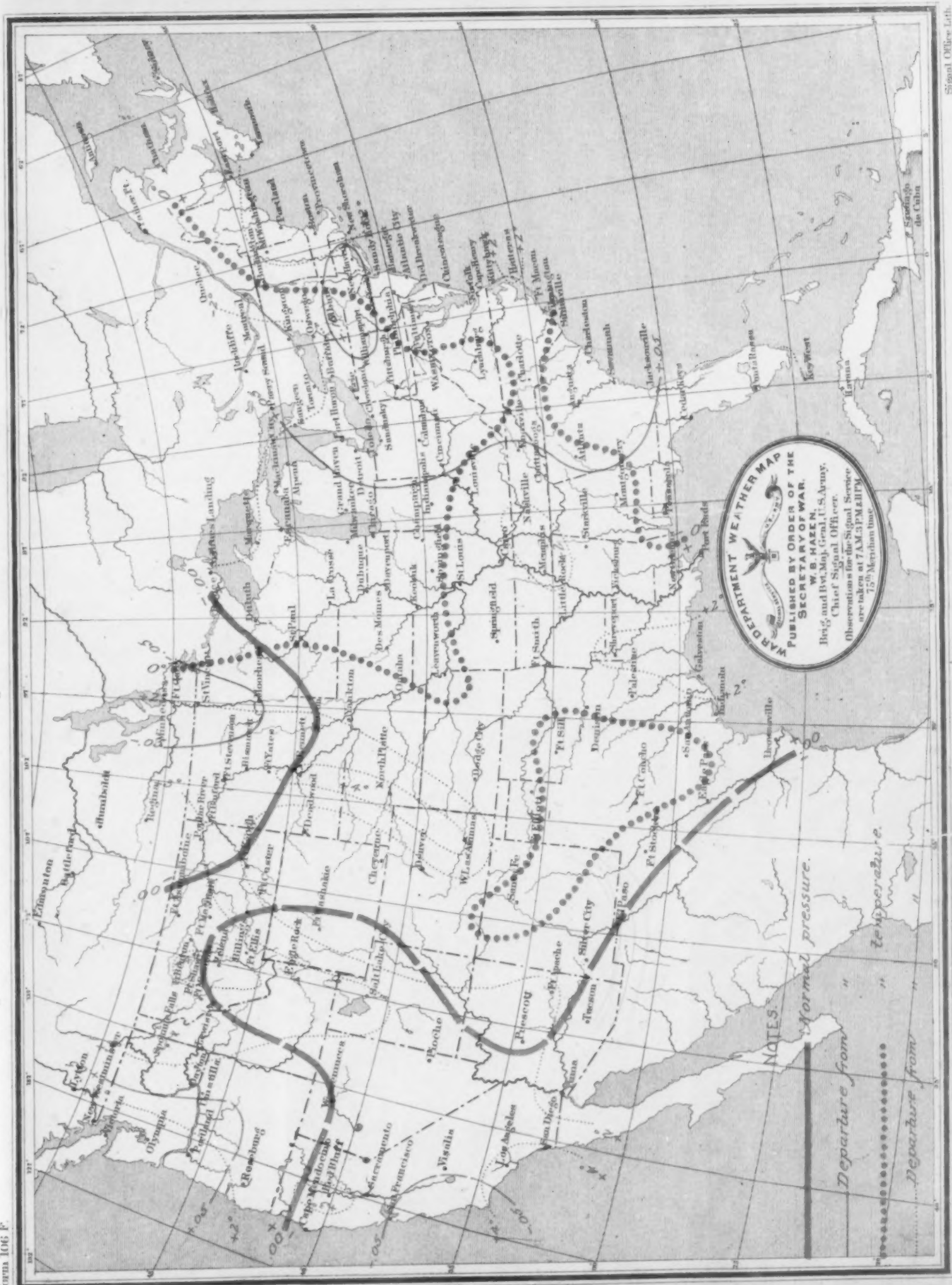


Chart IV. Departures from Normal Atmospheric Pressure and Temperature. April, 1885.

Form 1046 F.



Signal Office Lith.

Al
An
As
A.
Be
Bi
Br
Br
s

Observer and place of observation.	Observer and place of observation.	Observer and place of observation.	Observer and place of observation.
Anderson, Dr. W. W., Stateburg, S. C.	Deming, H. D., Wellsboro, Pa.	Jones, Dr. E. U., Taunton, Mass.	Smith, H. D., Monticello, Iowa.
Altamir, J. M., Independence, Kans.	Dozier, Wm., Mattoon, Ill.	Jordan, Dr. M. D. L., Milan, Tenn.	Shahan, Chas. C., Edgington, Ill.
Adams, Dr. O. H., Vineland, N. J.	Dewhurst, Rev. E., Voluntown, Conn.	Jones, Ira B., Neillsville, Wis.	Safford, A. T., Williamstown, Mass.
Andrews, L., Southington, Conn.	Day, Theodore, Dyberry, Pa.	Jones, F. M., Puerto de Luna, N. Mex.	Sherman, W. B., Manchester, Iowa.
Abbott, Dr. E. K., Salinas City, Cal.	Dawson, Wm., Spiceland, Ind.	Knapp, J. G., Limona, Fla.	Smith, Rev. D. W., Troy, Pa.
Alexander, S., Birmingham, Mich.	Dunton, Lieut. W. R., Dorset, Vt.	Keese, G. Pomeroy, Cooperstown, N. Y.	Samostz, Oscar, Austin, Tex.
Arents, Hiram, Oroville, Cal.	Dunlap, W. L., Tecumseh, Nebr.	Kuhne, F. W., Fort Wayne, Ind.	Standenmayer, Dr. L. R., Lincoln, N. C.
Bennett, Geo., Bandon, Oreg.	Dow, Roswell, Sycamore, Ill.	Keeler, W. F., Mayport, Fla.	Snell, Miss S. C., Amherst, Mass.
Beloit College, Beloit, Wis.	Dudley, C. B., Altoona, Pa.	Kirkwood, E., Mauzy, Ind.	Shaw, E., Maud, Kans.
Bell, Joseph, Franklin, Pa.	Duton, Hosea, Woodstock, Vt.	Kauffman, H. W., Dillingersville, Pa.	Sim, John R., Summit, Va.
Brainerd, Dr. H. G., Independence, Iowa.	Dunlap, J. B., Charleston, Ill.	King, W. R., Yellow Springs, Ohio.	Sommerville, W. B., Birmingham, Ala.
Baker, Dr. Henry B., Lansing, Mich.	Dechant, Wm. H., Mahanoy Plane, Pa.	Lueps, Miss Johanna, Manitowoc, Wis.	Shepard, E. M., Springfield, Mo.
Beall, Dr. R. L., Leicoir, N. C.	Douglas, Dr. B. H., Asheville, N. C.	Lincoln, A. T., Marion, Va.	Starr, Prof. F., Cedar Rapids, Iowa.
Brendel, Dr. Fred., Peoria, Ill.	Eliason, W. A., Statesville, N. C.	Loomis, J. C., Jeffersonville, Ind.	Sadler, Prof. H. E., Emporia, Kans.
Bentley, David, Princeton, Cal.	Eckstein, Rev. M., Conception, Mo.	Lay, Dr. F. H., Pueblo, Colo.	Spillman, J. J., Pierce City, Mo.
Bowman, Peter, Ruggles, Ohio.	Ellis, John, Marquette, Nebr.	Lucas, Dr. G. L., Albion, Idaho.	Stone, W. E., Amherst, Mass.
Boerner, Prof. Chas. G., Vevay, Ind.	Ellsworth, W. W., Hartford, Conn.	Luther, S. M., Garrettsville, Ohio.	Sargent, J. B., Leicester, Mass.
Bartlett, E. B., Vermillion, N. Y.	Elliott, Rev. J. C., Swanwick, Ill.	Ladshaw, Geo. E., Pacolet, S. C.	Swezey, Prof. G. D., Crete, Nebr.
Baldwin, A. L., Bethel, Conn.	Ewell, Dr. M. D., South Evarston, Ill.	Loud, Prof. F. H., Colorado Springs, Colo.	St. Auburn, Wm. T., Tower House, Cal.
Bardsley, Jas. G., Nephi, Utah.	Fernald, Prof. M. C., Orono, Me.	McDonogh Institute, McDonogh, Md.	Trembley, Dr. J. B., Oakland, Cal.
Briggs, John, Albany, Oreg.	Ferris, B. F., Sunman, Ind.	McCready, Miss L. A., Fort Madison, Ia.	Todd, Prof. David P., Amherst, Mass.
Beans, Thos. J., Moorestown, N. J.	Fouch, Dr. A., College City, Cal.	Moore, C. R., Bird's Nest, Va. [Iowa]	Teale, Rev. A. K., Milton, Mass.
Betts, Prof. Arthur, Webster, Dak.	Foss, E. T., Hydesville, Cal.	Munn, A. M., Kalamazoo, Mich.	Trumble, Geo. S., Genoa, Nebr.
Breed, J. E., Embarras, Wis.	Fox, F. E., Fall Brook, Cal.	Metcalf, Dr. John G., Mendon, Mass.	Turnbo, Silas C., Pro Tem, Mo.
Buck, Mrs. R., Red Willow, Nebr.	Fuller, E. N., Tacoma, Wash. T.	Micklem, J. Howard, Variety Mills, Va.	Tillinghast, C. B., Albany, N. Y.
Baker, Dr. L. J., Ottumwa, Iowa.	Frick, Prof. J. H., Warrenton, Mo.	Meehan, Thos., Germantown, Pa.	Turner, Ernest, Point Pleasant, La.
Boies, Lieut. A. H., Hudson, Mich.	Friend, Chas. W., Carson City, Nev.	Moore, Nathan, Grampian Hills, Pa.	Tyrrel, A. C., Madison, Nebr.
Becker, Rev. W., Prairie du Chien, Wis.	Failyer, Prof. G. H., Manhattan, Kins.	Mikesell, Thos., Wauseon, Ohio.	Treimer, Geo., Round Grove, Iowa.
Ballou, Dr. N. E., Sandwich, Ill.	Ferguson, W., Paterson, N. J.	McPherson, Wm., San Rafael, Cal.	Thompson, R. J., Tiffin, Ohio.
Boyd, Joseph, Oskaloosa, Iowa.	Fleming, J., Readington, N. J.	McClintock, F., West Union, Iowa.	Upton, Prof. W., Providence, R. I.
Beebe, A., Manistique, Mich.	Gates, W. B., Burlington, Vt.	Marshall, G., Cresco, Iowa.	Van Inwegen, C. F., Port Jervis, N. Y.
Bryant, A. F., Yutan, Nebr.	Grathwohl, John, Blooming Grove, Pa.	Vitchell, Dr. D. W., Harrisville, Mich.	Voegell, Adolphus, Des Moines, Iowa.
Blachly, C. P., Manhattan, Kans.	Gillingham, Milnor, Fallsington, Pa.	Miller, H. D., Drifton, Pa.	Venable, Prof. F. P., Chapel Hill, N. C.
Bailey, Wm., Stowe, Vt.	Gardiner, R. H., Gardiner, Me.	McNeill, M., Princeton, N. J.	Vermillion, W. W., Curryville, Mo.
Blake, J. H., Christmas Prairie, Cal.	Gowey, H. D., North Lewisburg, Ohio.	Martin, T., Medora, Dak.	Washburne Observatory, Madison, Wis.
Beecher, Chas., Wysox, Pa.	Gibson, John H., Salina, Kans.	McLain, F. H., Seward, Nebr.	Wild, Rev. E. P., Newport, Vt.
Charbonnier, Prof. L. H., Athens, Ga.	Green, Dr. Jesse C., West Chester, Pa.	Morehead, J. F., Wytheville, Va.	Williams, Rev. C. F., Ashwood, Tenn.
Cook, S. A., Milledgeville, Ga.	Gerrish, S. H., Sacramento, Cal.	Neal, Dr. J. C., Archer, Fla.	Wing, Miss M. E., Charlotte, Vt.
Cotton, Dr. D. B., Portsmouth, Ohio.	Gray, J. W., Stockham, Nebr.	Newbegin, John D., Anna, Ill.	West, Silas, Cornish, Me.
Clark, A. C., Wausau, Wis.	Goodwin, Wm., North Colebrook, Conn.	Nelson, P. P., Northport, Mich.	Went, E. C., Frankfort, Ky.
Casey, Geo., Auburn, N. Y.	Geddings, Dr. W. H., Aiken, S. C.	Newcomb, G. S., Westborough, Mass.	Wylie, Wm., Mount Forest, Canada.
Crawford, E. A., Liberty Hill, La.	Gregory, J. W., Sherlock, Kans.	Nourse, H. D., Washington, D. C.	Walton, J. P., Muscatine, Iowa.
Curtiss, G. G., Fallston, Md.	Gordon, Dr. G. G., Swartz Creek, Mich.	Noll, A. B., Somerville, N. J.	Wall, S. E., Traverse City, Mich.
Cornell University, Ithaca, N. Y.	Gray, F. R., Yates Centre, Kans.	Nicholson, Dr. A. W., Boyne, Mich.	Woodstock College, Woodstock, Md.
Coeke, A. R., Indianola, Iowa.	Gillingham, Wm., Acetotink, Va.	Norberg, A., Richardson, Dak.	Wolfe, John H., Wellington, Kans.
Cutting, Hiram A., Lunenburg, Vt.	Grymes, A. J., Blacksburg, Va.	Norcom, Prof. T. J., Rudin, N. C.	West, Dr. Jos. O., Princeton, Mass.
Crosier, Adam, Laconia, Ind.	Garlick, Rev. Dr. J. R., Brington, Va.	Osborn, Dr. Thos. C., Cleburne, Tex.	
Caulkins, John S., Thornville, Mich.	Gray, Capt. A. W., Kenewick, Wash. T.	Olds, H. D., Cedar Rapids, Iowa.	Washington Receiving Reservoir, D. C.
Clark, T. A., Weldon, N. C.	Heath, E. R., Wyandotte, Kans.	Owsley, Dr. J. B., Jacksonborough, O.	Distributing " "
Crawford, D. F. G., Leedsdale, Pa.	Horn, Dr. H. B., Atchison, Kans.	Otis, H. G., Washington, Pa.	Great Falls Reservoir, Md.
Carleton College, Northfield, Minn.	Hiram College, Hiram, Ohio.	Pearce, Thomas, Eola, Oreg.	Rock Creek Bridge, D. C.
Chandler, Dr. W. J., South Orange, N. J.	Harvard College Observatory, Cambridge, Mass.	Pierson, Rev. J., Ionia, Mich.	Weir's Bridge, N. H.
Cass, John J., Allison, Kans.	Hammit, John W., College Hill, Ohio.	Powrie, W., Sussex, Wis.	Winipiseogee Woodstock, N. H.
Chase, Pliny E., Haverford College, Pa.	Heaton, Isaac E., Fremont, Nebr.	Parrish, Geo. W., Ellensburg, Wash. T.	Lake Cotton Wolfborough, N. H.
Comstock, Prof. F. M., Le Roy, N. Y.	Helm, Thos. B., Loganport, Ind.	Patter-on, Wm., Salem, N. J.	Lake Village, N. H.
Cochran, Wm. P., Clay Centre, Kans.	Hoskinson, R. M., Bainbridge Island, Wash. Ter.	Patrick, J. M., North Volney, N. Y.	Bristol, N. H.
Calhoun, P. B., Austin, Tenn.	Hunter, Dr. T. C., Wabash, Ind.	Purdue University, La Fayette, Ind.	Belmont, N. H.
Carpenter, Dr. W. B., Leavenworth, K.	Haywood, John, Westerville, Ohio.	Petersen, Dr. F., Comfort, Tex.	Ashland, N. H.
Christ, Jacob, Franklin, Wis.	Hyde, G. A., Cleveland, Ohio.	Pritchett, H. C., Huntsville, Tex.	
Cheney, Wm., Minneapolis, Minn.	Hussler, B. K., Chambersburg, Pa.	Prosser, Chas. S., Ithaca, N. Y.	Willis, O. R., A. M., Ph. D., White Plains, N. Y.
Cox, Prof. T. E., Emmitsburg, Md.	Hartzler, J. A., Mottville, Mich.	Parker, D., Humboldt, Iowa.	Williams, Dr. A. C., Elk Falls, Kans.
Coffee, Wm. K., Carthage, Mo.	Hall, J. B., Worcester, Mass.	Remington, C. V. S., Fall River, Mass.	Wigg, Dr. Geo., East Portland, Oreg.
Collin, Prof. Alonzo, Mt. Vernon, Iowa.	Hager, Mrs. L. G., Terre Haute, Ind.	Robertson, T. D., Rockford, Ill.	Woods, Mrs. Dr. A. G., Maynard, Iowa.
Cooper, Dr. Geo. C., Manatee, Fla.	Howe, Prof. J. L., Richmond, Ky.	Rogers, F. M., Luling, La.	Wetmore, E. L., Tucson, Ariz.
Cleveland, Dr. G. H., Moorestown, Mich.	Hoyt, F. C., Easton, Pa.	Renfrew, H. N., Wilton Center, Ill.	Wright, J. W. A., Greensboro, Ala.
Cowgill, Miss S. P., Sterling, Kans.	Houghton Farm Experiment Station, Mountainville, N. Y.	Rodman, Thos. R., New Bedford, Mass.	Watson, Dr. S. T., Nayatt Point, R. I.
Culver, G. E., Vermilion, Dak.	Heatwole, L. J., Dale Enterprise, Va.	Rockwood, Prof. C. G., Princeton, N. J.	Wadsworth, Dr. J. L. R., Collinsville, Ill.
Clayton, H. H., Ann Arbor, Mich.	Heacock, J. L., Quakertown, Pa.	Rerick, R. H., La Grange, Ind.	Watson, Evan, Fort Scott, Kans.
Corbin, F. E., Dudley, Mass.	Hazen, Rev. A., Deerfield, Mass.	Rotch, A. L., Blue Hill, Mass.	Widman, Rev. C. M., Grand Coteau, La.
Chubbs, Thos. H., Post Mills, Vt.	Harris, W. C., Dover, N. J.	Russell, Geo. W., Wellsburg, W. Va.	Wistrom, M. F., Harvard, Nebr.
Capen, F. S., Waterville, Me.	Hickman, E. A., Independence, Mo.	Runge, C., New Ulm, Tex.	Winn, Rev. T. S., Green Springs, Ala.
Coffin, Prof. S. J., Easton, Pa.	Harper, Geo. W., Cincinnati, Ohio.	Rivers, C. M., Oswego, Kans.	Ward, J. B., Guilford, Ind.
Cutler, J. L., Quitman, Ga.	Hodge, Rev. F. B., Wilkes Barre, Pa.	Shaw, J., Chester, Minn.	Whitney, Chas. E., Humphrey, N. Y.
Cole, Seward, Caluenga, Cal.	Houskeeper, H. S., S Bethlehem, Pa.	Shriver, E. T., Cumberland, Md.	Whitmore, J. E., Gallinas Springs, N. Mex.
Crowder, F. L., Elk Park, N. C.	Humphrey, Dr. I., Fairbury, Nebr.	Seltz, Chas., De Soto, Nebr.	Whittington, G., Mount Ida, Ark.
Cutler, B. B., Heath, Ma. s.	Howland, Mrs. W. P., Jefferson, Ohio.	Scott, Thos. G., Forsyth, Ga.	Watters, Dr. J., Westmoreland, Kans.
Chapin, Adams, Poway, Cal.	Hurlin, Rev. Wm., Antrim, N. H.	Stucky, Dr. C. T., Helvetia, W. Va.	Yetter, Wm. G., Catawissa, Pa.
Childs, W. A., Brattleborough, Vt.	Harris, T. C., Raleigh, N. C.	Stern, Jacob T., Logan, Iowa.	Yates, T. P., Factoryville, N. Y.
Carpenter, Prof. L. G., Lansing, Mich.	James, John W., Marengo, Ill.	Slade, Elis a., Somerset, Mass.	Young, Geo. R., Penn Yan, N. Y.
Carter, Rev. Dr. W. H., Tallahassee, Fla.		Slenker, Mrs. E. D., Snowville, Va.	Yarborough, T. B., Honey Grove, Tex.
Davis, Jacob, Rowe, Mass.		Scribner, H. F. J., Strafford, Vt.	Zimmerman, F. C., Bunker Hill, Ill.
Dickinson, Jas. R., Guttenberg, Iowa.		Shriver, Howard, Wytheville, Va.	Zimmermann, I. H., Wentworth, Dak.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for April, 1885.

Alcatraz Island, Cal.	Brown, Fort, Tex.	Hamilton, Fort, N. Y.	Monroe, Fort, Va.	Plattsburg Barracks, N. Y.	Sully, Fort, Dak.
Angel Island, Cal.	Barrancas, Fort, Fla.	Klamath, Fort, Oreg.	McHenry, Fort, Md.	Pembina, Fort, Dak.	Sisseton, Fort, Dak.
Assinaboine, Fort, Mont.	Concho, Fort, Tex.	Keogh, Fort, Mont.	Mount Vernon B'ks, Ala.	Preble, Fort, Me.	Shaw, Fort, Mont.
A. Lincoln, Fort, Dak.	Columbus, Fort, N. Y.	Lyon, Fort, Colo.	McDowell, Fort, Ariz.	Randall, Fort, Dak.	Totten, Fort, Dak.
Benicia Barracks, Cal.	David's Island, N. Y. H.	Lewis, Fort, Colo.	Meade, Fort, Dak.	Reno, Fort, Ind. T.	Townsend, Fort, Wash. T.
Bidwell, Fort, Cal.	Ellis, Fort, Mont.	Mason, Fort, Cal.	Mejave, Fort, Ariz.	Robinson, Fort, Nebr.	Union, Fort, N. Mex.
Brady, Fort, Mich.	Fred Steele, Fort, Wyo.	Madison Barracks, N. Y.	Niagara, Fort, N. Y. [Cal. Snelling, Fort, Minn.]	Yat-s, Fort, Dak.	
Bridge, Fort, Wyo.	Gaston, Fort, Cal.	McDermitt, Fort, Nev.	Presidio of San Francisco, Saint Augustine, Fla.		

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for April, 1885.

Alabama State Weather Service, under direction of Prof. P. H. Mell, Jr., Auburn, Alabama.
 Georgia State Weather Service, under direction of Hon. J. T. Henderson, Atlanta, Ga.
 Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Mo.
 Nebraska State Weather Service, under direction of Prof. Goodwin D. Swezey, Crete, Nebraska.
 Indiana Volunteer Weather Service, under direction of Prof. W. H. Ragan, Greencastle, Indiana.
 Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
 Ohio State Weather Service, under direction of Prof. T. C. Mendenhall, Columbus, Ohio.
 Tennessee State Weather Service, under direction of Hon. A. J. McWhirter, Nashville, Tennessee.
 Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
 Illinois State Weather Service, under direction of Mr. C. F. Mills, Springfield, Ill.
 New England Meteorological Society: Prof. Winslow Upton, of Providence, director; Mr. W. M. Davis, of Cambridge, secretary.
 Data have also been used from meteorological records of the Central Pacific and Southern Pacific railway companies.

PRICE-LIST OF STANDARD METEOROLOGICAL INSTRUMENTS, APPARATUS, TEXT-BOOKS, FORMS AND PUBLICATIONS.

Furnished by Henry J. Green, 771 Broadway, New York City.

BAROMETERS.

Common pattern and finish, vernier reading to 1,000th inch, in pine box:			
Reading down to 28 inches.....	\$30.00	Packing and shipping by express, \$2.50	
do. 24 do.	\$1.00	do.	2.50
do. 20 do.	\$3.00	do.	2.50
do. 14 do. (two verniers).....	\$3.00	do.	2.50
Common pattern and finish, vernier reading to 1,000th inch, in pine box:			
Reading down to 28 inches.....	\$34.00	Packing and shipping by express, \$2.50	
do. 24 do.	\$9.00	do.	2.50
do. 20 do.	\$4.00	do.	2.50
do. 14 do. (two verniers).....	\$4.00	do.	2.50
Best pattern and finish, vernier reading to 1,000th inch, in pine box:			
Reading down to 28 inches.....	\$36.00	Packing and shipping by express, \$2.50	
do. 24 do.	\$9.00	do.	2.50
do. 20 do.	\$2.00	do.	2.50
do. 14 do. (two verniers).....	\$5.00	do.	2.50
Leather case, in place of pine box.....	\$1.00	do.	—
Marine barometer.....	\$3.00	do.	2.50
Mountain barometer, two verniers, in leather case, to 20,000 feet.....	\$3.00	do.	2.50
Mountain barometer, two verniers, in leather case, to 10,000 feet.....	\$5.00	do.	2.50
Standard barometer for observatories.....	\$5.00	do.	3.25
Barometer tube (glass).....	1.25	do.	1.00
Barometer tube, filled and replaced.....	\$6.00	do.	2.50
Barometer cistern, complete.....	4.25	do. ....	.00
Light-bar tripod for barometer.....	10.00	do. ....	.65

THERMOMETERS.

Thermometer for dry or wet-bulb.....	\$ 3.00	Packing and shipping by express, \$.60	
do. wet-bulb, support for.....	.50	do. ....	.25
do. do. cup for.....	.50	do. ....	.25
do. dry-bulb, support for.....	.15	do. ....	.25
do. maximum registering.....	5.00	do. ....	.60
do. minimum do.	4.00	do. ....	.60
do. solar radiation.....	10.00	do. ....	.75
do. terrestrial radiation.....	7.00	do. ....	.60
do. small, in metal case, for pocket, engraved stem.....	2.50	do. ....	.25
do. water.....	3.00	do. ....	.60

L. R. 11547, P. D., 1882.

Furnished by the Hahl Manufacturing Company, 13 Mercer Street, Baltimore, Maryland.

Anemometer, "Robinson's," (velocity).....	\$25.00	Packing and shipping by express, \$1.05	
Electrical recording apparatus, "Gibbon's," (velocity).....	\$7.50	do.	1.05
Anemograph register (direction and velocity).....	80.00	do.	1.20

L. R. 11503, P. D., 1882.

Furnished by John McDermott & Bros., 310 Pennsylvania Avenue, Washington, D. C.

Wind vane, sunset.....	\$ 8.00	Packing, \$—	
do. large.....	65.00	do.	5.00
do. "Eccard's" attachment for use with anemograph.....	10.00	do.	—
do. base for anemograph.....	10.00	do.	—
Anemometer, telescopic rod for, new pattern.....	57.00	do.	3.00

L. R. 11327, P. D., 1882.

Furnished by L. H. Rogers, 75 Maiden Lane, New York City.

Signal Service manifold Forms No. 107 A, in books of 100 forms, per book.....	\$ 1.35		
do. 107 B, do.	1.60		
do. 107 C, do.	1.60		
do. 107 D, do.	1.70		
do. 107 E, do.	1.75		
do. 107 F, do.	2.00		
do. 107 G, do.	2.00		
do. 107 H, do.	2.50		
do. 107 I, do.	2.75		
do. 107 I-sub, do.	2.75		
do. 107 K, do.	2.75		
Signal Service hektographed Forms No. 107 K, per thousand.....	14.00		
Indications (Form 109 B), per hundred.....	.22		

Furnished by James J. Chapman, 915 Pennsylvania Avenue, Washington, D. C.

"Loomis'" Meteorology.....	1.60		
----------------------------	------	--	--

L. R. 4021, P. D., 1883.

Furnished by John Schmitzbach, 600 7th Street, Washington, D. C.

Rain-gauge, galvanized iron, with overflow and measuring-stick.....	\$ 2.50		
Rain-gauge, copper, with galvanized iron overflow and measuring-stick.....	1.50		
Measuring-sticks, extra.....	.25		
Farmers' weather case.....	54.70		
Case for water thermometer.....	7.50		

L. R. 4051, P. D., 1883.

Furnished by Property and Dispensing Officer, Signal Service, U. S. A., Washington, D. C.

Maps in one color without reports or isobaric lines, each.....	.015		
Maps on manifold paper without reports or lines, in books of 100, per book.....	2.75		
Maps in one color with current reports, isobars, and isotherms, each.....	.02		
Monthly Weather Review.....	.10		
Copies of Daily Bulletin, with Synopsis, Indications, and Facts, with maps, stitched in monthly volumes, each (L. R. 10235, P. D., 1881).....	2.25		
Farmers' Bulletin, mailed from Washington daily, except Sundays, each.....	.01		
Farmers' Bulletin, mailed from other printing stations daily, except Sundays, each, (postage .01).....	.01		
International Daily Bulletin, per copy, each, including the Monthly Summary when daily is subscribed for for the entire month.....	.11		
District Maps, each.....	.02		

* Any of the above-enumerated instruments, apparatus, etc., may be obtained at the prices named, with such *additional cost* of packing and shipping as is shown opposite the items respectively. The charges for expressage are to Washington, D. C., and for other distances will be the actual charges of express companies.

The office will be pleased to procure any of the articles, upon the receipt of their money value, including charges for packing and shipping, but all remittances by draft, money-order, or postal note should be made payable to the parties furnishing the articles desired. In case of money-orders state plainly to whom made payable, but send them in a separate letter. If requested by the parties ordering instruments, a comparison will be made with the standards in this office before forwarding, but, if not, they can be ordered direct, by reference to price list furnished from this office, except those furnished by Henry J. Green, successor to Messrs. J. & H. J. Green, which should always be ordered through this office. Purchasers must assume all risks of breakage when ordering instruments through this office. Postage stamps cannot be received as money.

Entered at the Post Office, Washington, D. C., as Second-Class Matter.

This Paper is furnished by the Government of the United States, without charge, to the Co-operating Observers acting with the Signal Office in the collection of Simultaneous Reports.